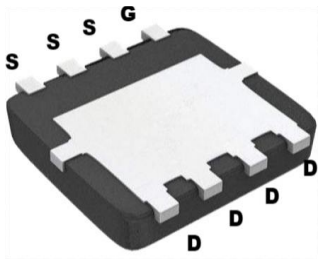
# XNM83N03DF

**30V N-Channel MOSFET**

## 1.Features

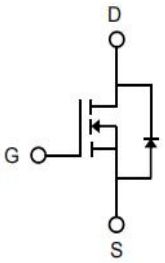
- Advanced Trench MOS technology
- Extremely low on-resistance RDS(on) and Low Gate Charge

PDFN5*6




## 2.Mechanical Data

- Case:Molded Plastic,PDFN5*6;
- 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 | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous ($T_C$ = 25°C) | $I_D$ | 82 | A |
| Drain Current-Continuous($T_C$ = 100°C) | | 52 | |
| Pulsed Drain Current[1)] | $I_{DM}$ | 205 | A |
| Power Dissipation ($T_C$ = 25°C) | $P_D$ | 42 | W |
| Single Pulsed Avalanche energy[(2)] | $E_{AS}$ | 68 | mJ |
| Avalanche Current | $I_{AS}$ | 37 | A |
| Junction Temperature | $T_J$ | -55~+150 | °C |
| Storage Temperature | $T_{STG}$ | -55~+150 | °C |
| Junction-to-Ambient Thermal Resistance[3)] | $R_{\theta JA}$ | 3.5 | °C/W |
| Junction-to-Case Thermal Resistance | $R_{\theta JC}$ | 55 | °C/W |

## 4.Electrical Characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Off Characteristics** | | | | | | |
| Drain-source breakdown voltage | $B_{VDSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | - | | V |
| Gate-source leakage current | $I_{DSS}$ | $V_{DS}$=30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate threshold voltage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| Drain-to-Source Leakage Current | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$ , $I_D$ = 250μA | 1 | 1.5 | 2.5 | V |
| Drain-to-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 30A | - | 2.8 | 3.6 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 20A | - | 4.6 | 6.2 | mΩ |
| **Dynamic Parameters** | | | | | | |
| Gate Resistance | $R_g$ | f = 1 MHz | - | 3 | - | Ω |
| Forward Transconductance | gfs | $V_{DS}$ = 5 V, $I_D$ = 20 A | - | 100 | - | S |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =15V ,$V_{GS}$=0V f=1.0MHz | - | 2590 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 389 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 318 | - | |
| **Switching Parameters** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$=15V, $V_{GS}$=10V $R_G$=3Ω,$R_L$=0.75Ω | - | 8 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 3 | - | |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 20 | - | |
| Turn-off Fail Time | $t_r$ | | - | 3 | - | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$I_D$=20,$V_{GS}$=10V | - | 20 | - | nC |
| | | $V_{DS}$=15V,$I_D$=20,$V_{GS}$=4.5V | - | 10 | - | |
| Gate-Source Charge | $Q_{gs}$ | $V_{DS}$=25V,$I_D$=8A,$V_{GS}$=10V | - | 3.5 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.5 | - | |
| **Drain-Source Diode Characteristics** | | | | | | |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V, $I_S$= 20A | - | 0.7 | 1 | V |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$ = 20 A, di/dt = 500 A / μs | - | 11 | - | nS |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | $I_F$ = 20A, dIS/dt = 500 A / μs | - | 17 | - | nC |

Notes：

1) Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

2) Limited by $T_{J(MAX)}$, starting $T_J$ = 25 °C, L = 0.1mH, $R_g$ = 25 Ω, $I_D$ = 37A.

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 Output characteristics

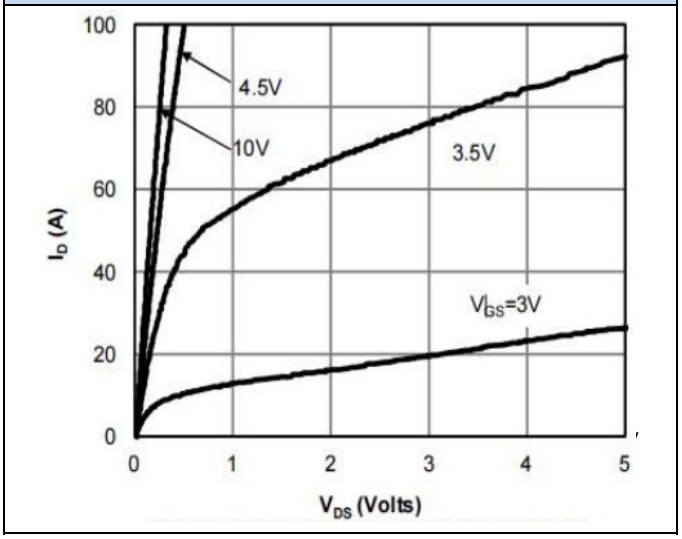



Fig 2 Transfer characteristics

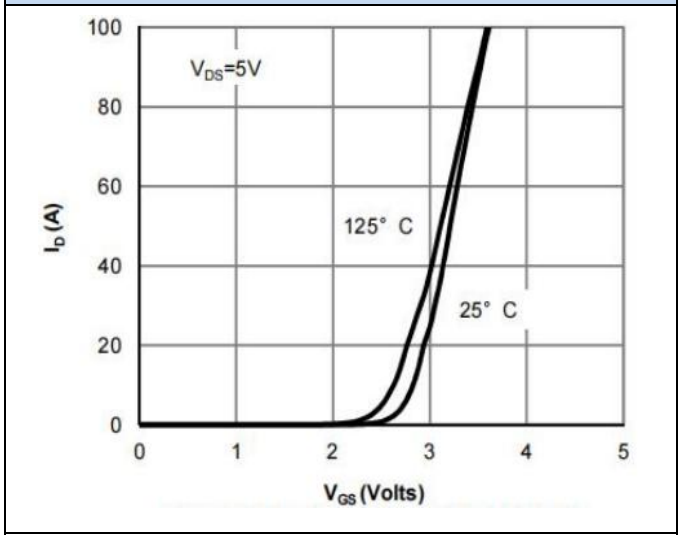



Fig.3 On-Resistance vs Drain Current and Gate Volatge(Note E)

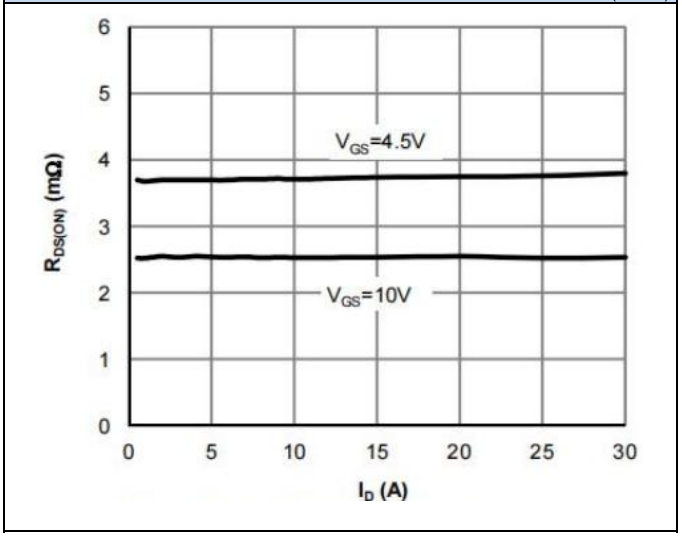



Fig.4 On-Resistance vs Junction Temperature(Note E)

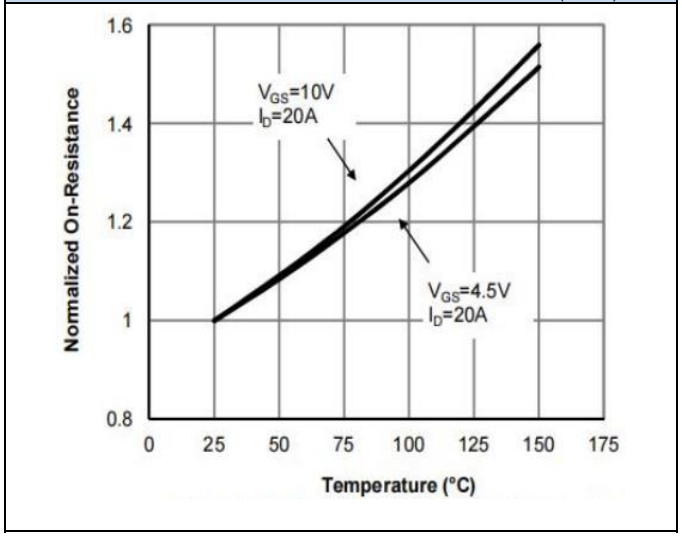



Fig.5 On-Resistance vs. Gate-Source Voltage (Note E)

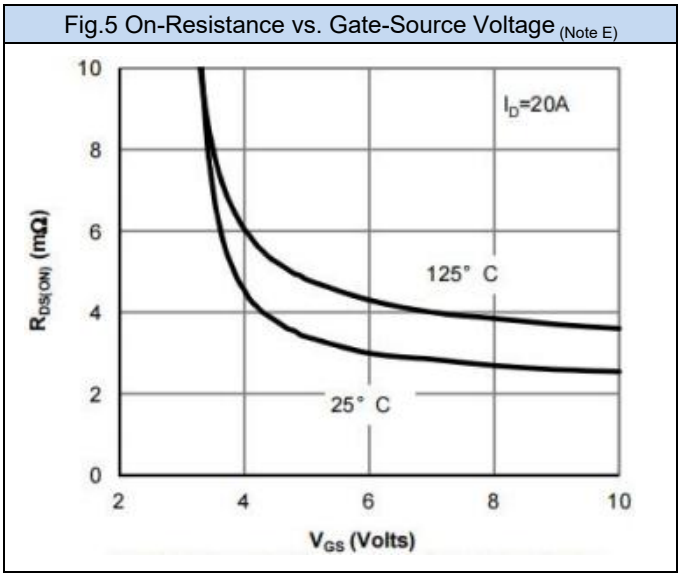



Fig.6 Body-Diode Characteristics(Note E)

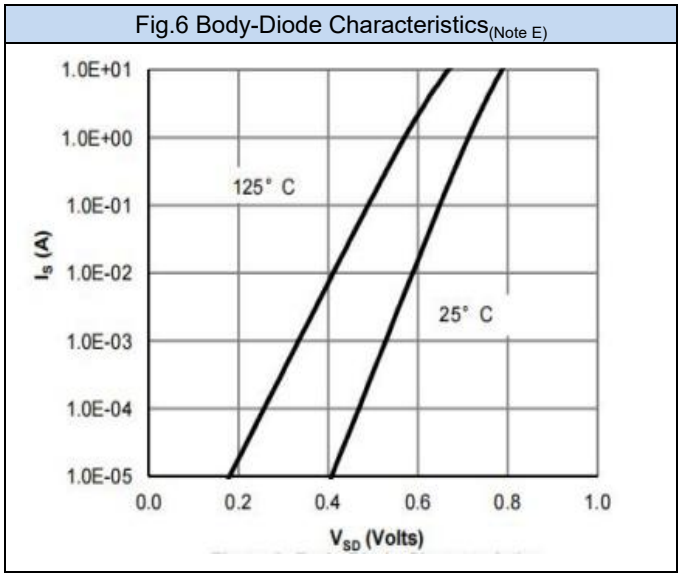


Fig. 7 Gate-Charge Characteristics

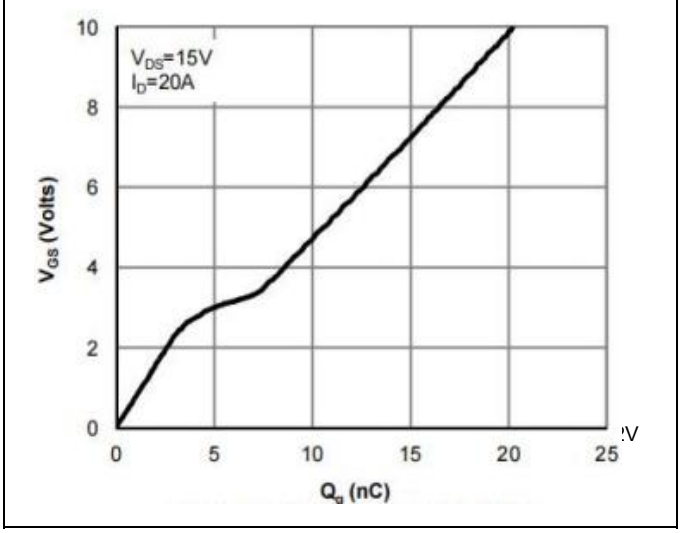



Fig 8 Capacitance Characteristics

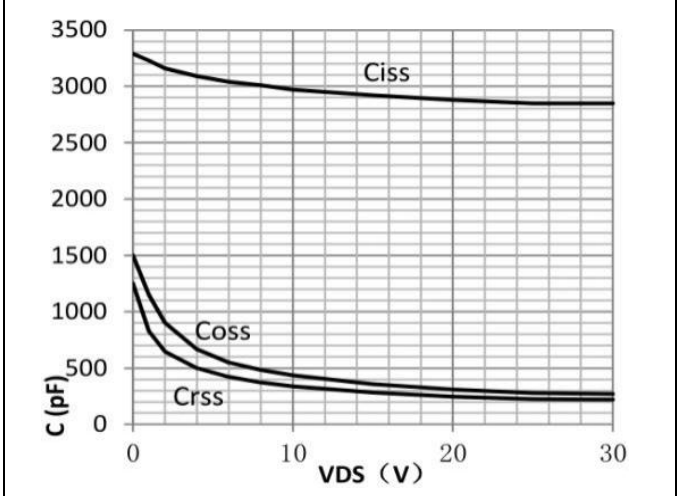



Fig.9 Maximum Forward Biased SafeOperating Area (Note F)

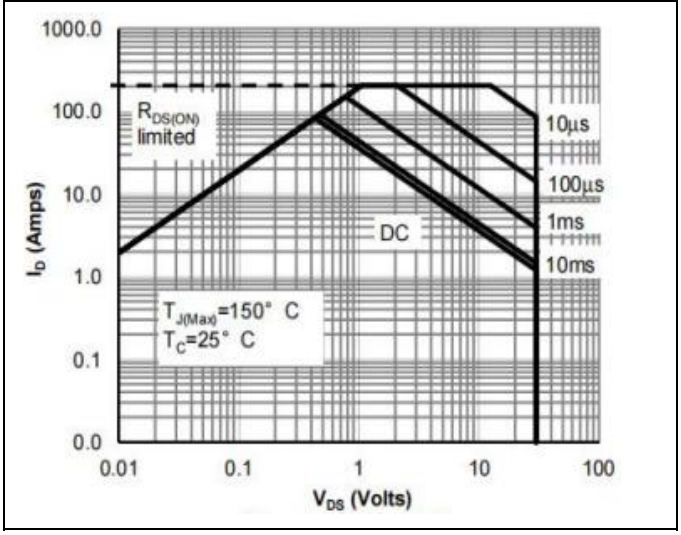



Fig.10 Single Pulse Power Rating Junction-toCase (Note F)

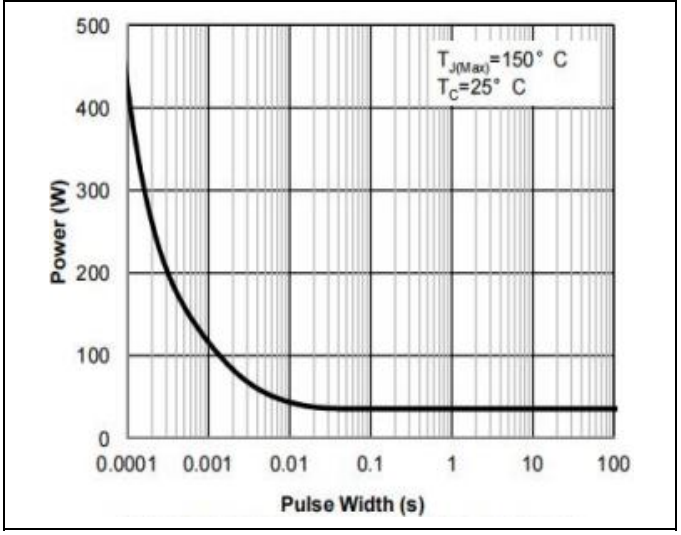



Fig.11 Normalized Maximum Transient Thermal impedance (Note F)

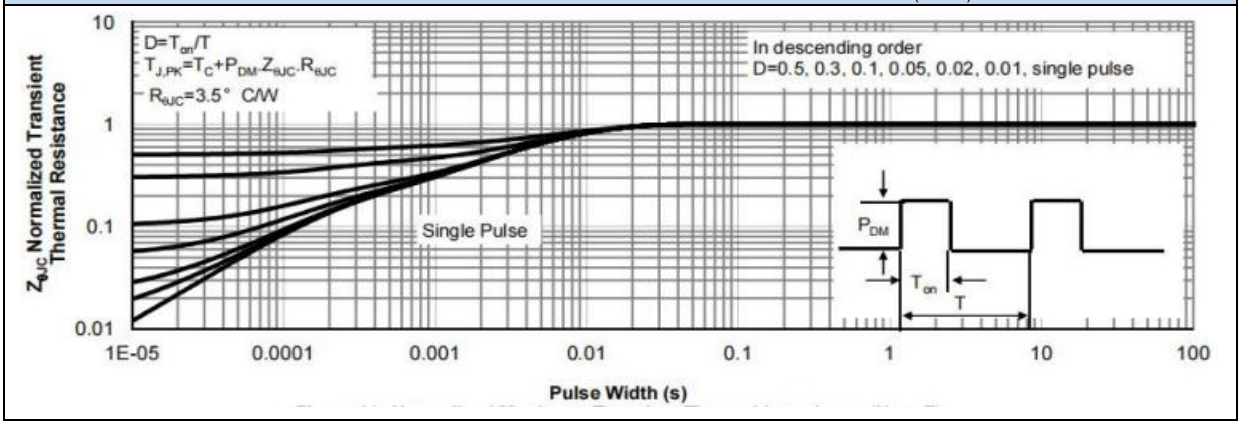


Fig 12 Power De-rating (Note F)

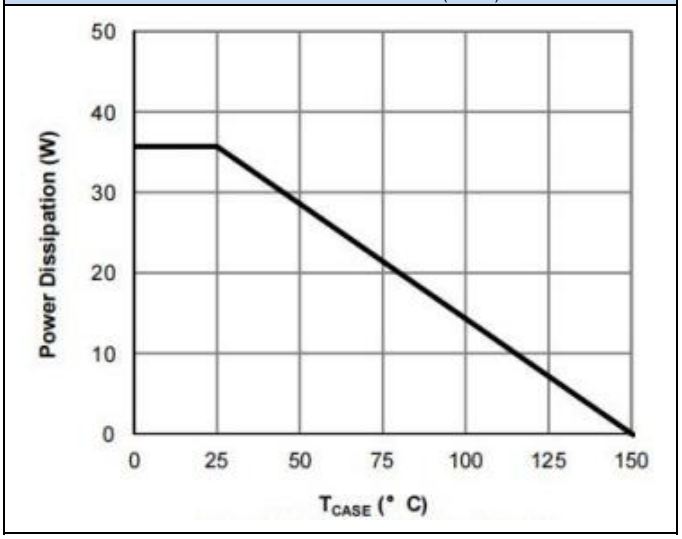



Fig.13 Current De-rating (Note F)

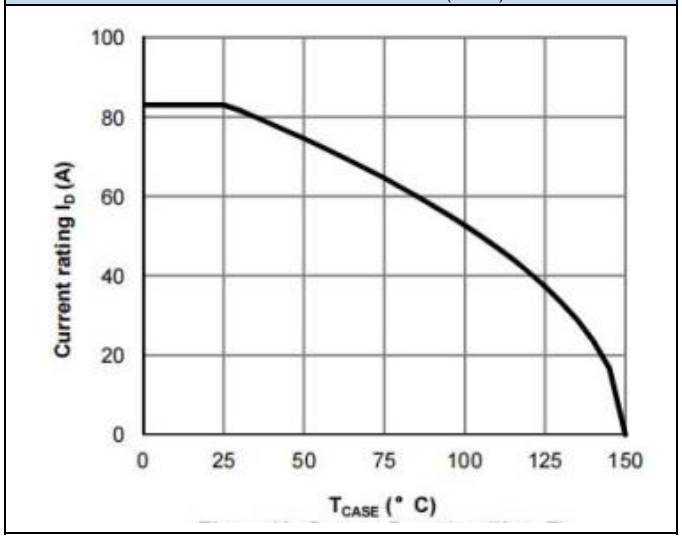



Fig.14 Single Pulse Power Rating Junction-to-Ambient (Note H)

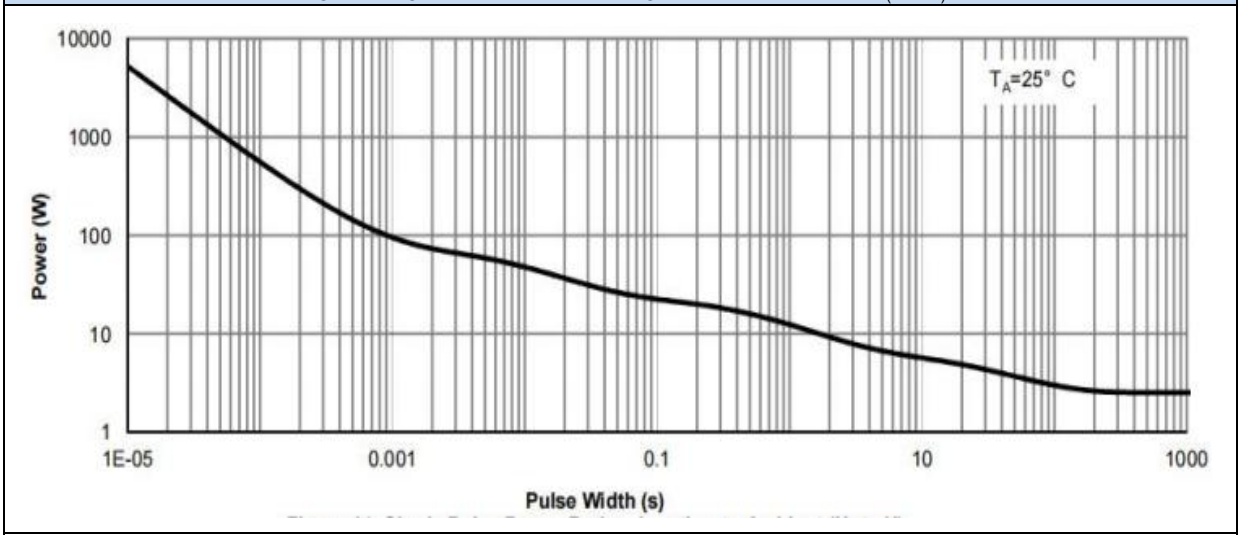
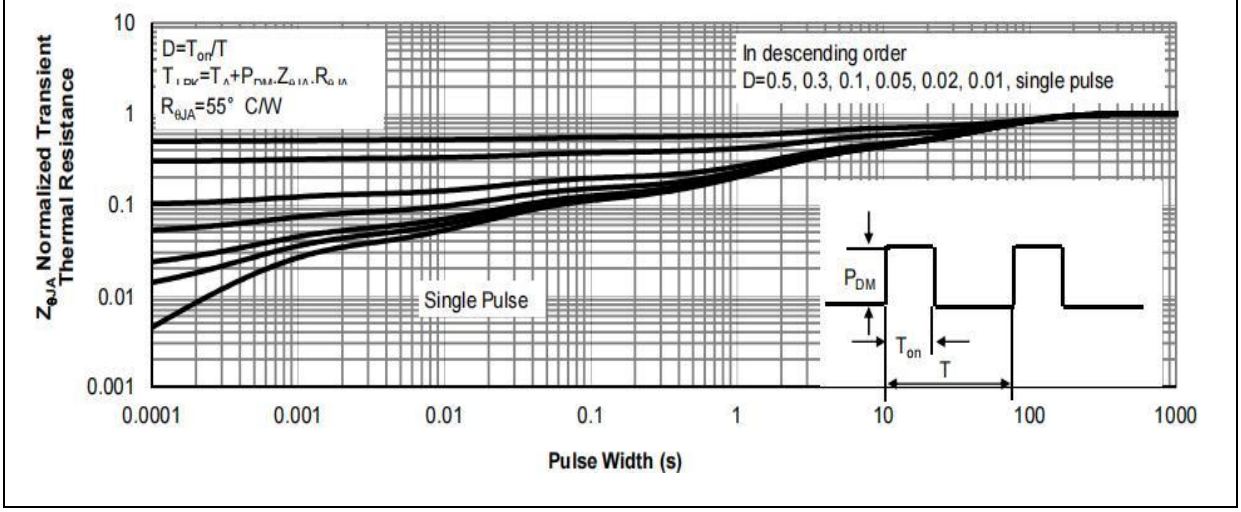



Fig.15 Normalized Maximum Transient Thermal Impedance (Note H)



## 6.Test Circuits

Fig.1-1 Switching times test circuit

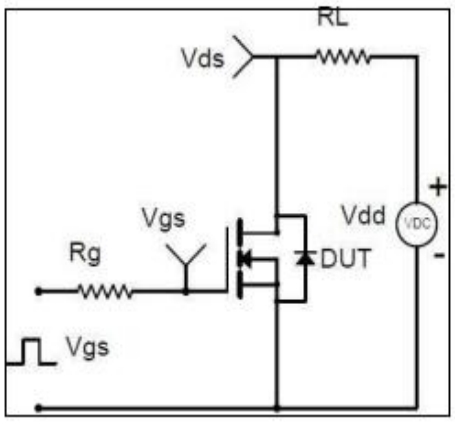



Fig.1-2 Switching Waveform

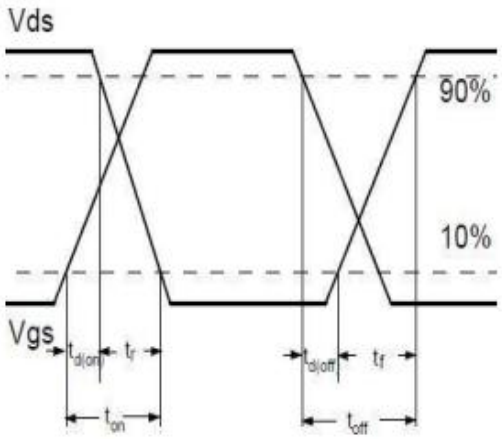



Fig.2-1 Gate charge test circuit

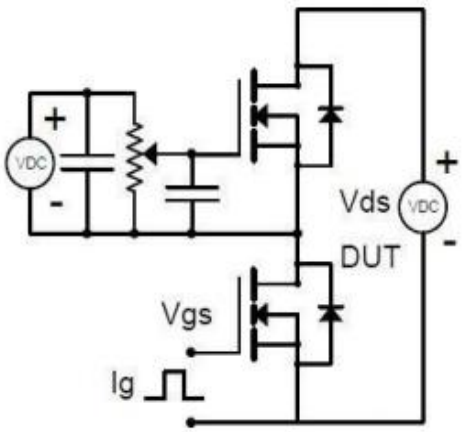



Fig.2-2 Gate charge waveform

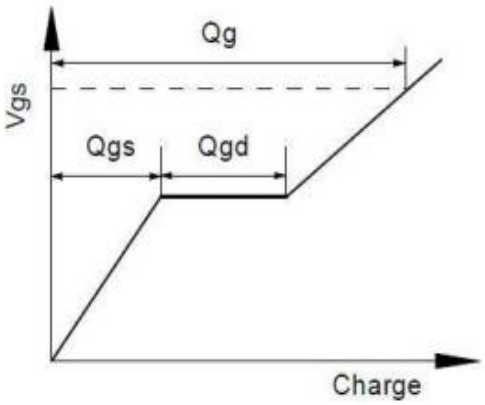



Fig.3-1 Avalanche test circuit

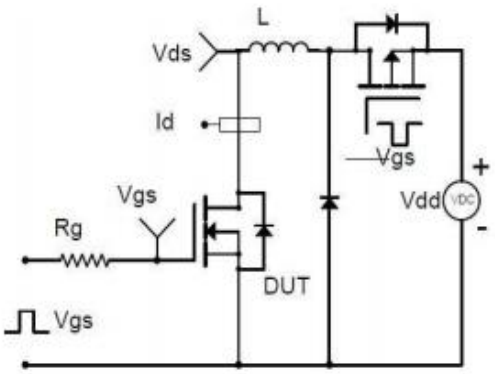
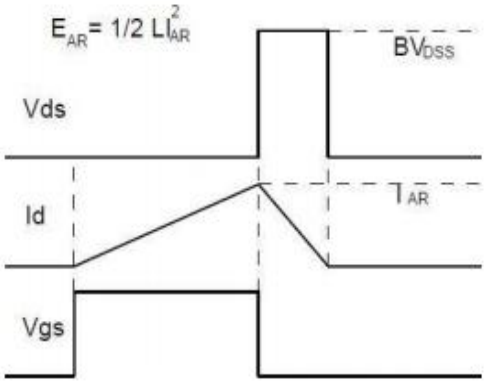
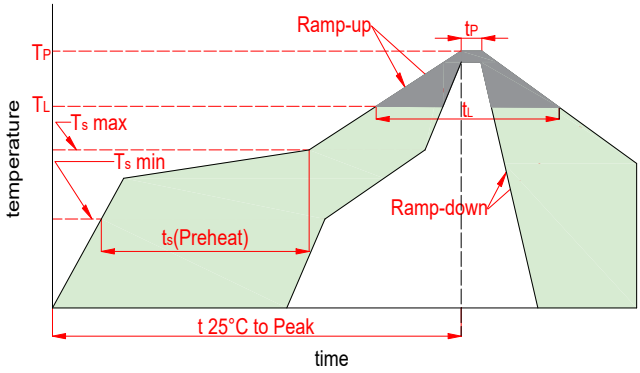



Fig.3-2 Avalanche waveform

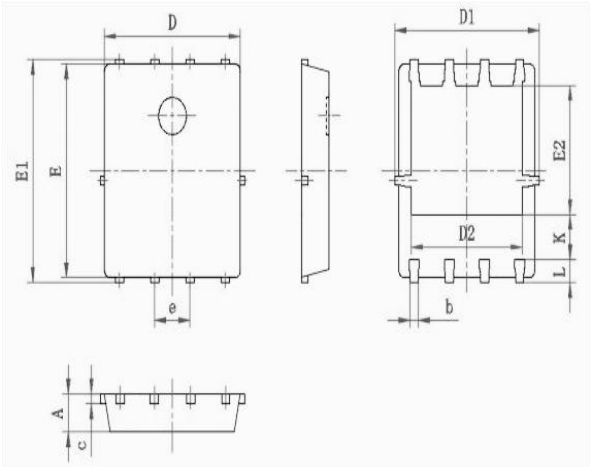


## 7. Soldering Parameters



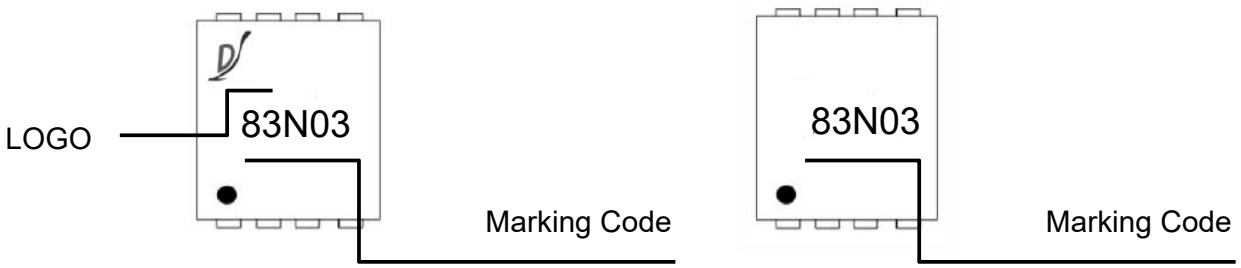

| Reflow Condition | | Lead-free |
|---|---|---|
| Pre Heat | Temp. min($T_s$(min)) | 150℃ |
| | Temp. max($T_s$(min)) | 200℃ |
| | Time(min to max)($t_s$) | 60~180s |
| Aver. ramp up rate(Liquidus Temp.)($T_L$)to peak | | 3℃/s max |
| $T_S$(max) to $T_L$-Ramp-up Rate | | 3℃/s max |
| Reflow | Temp.($T_L$)(Liquidus) | 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 | 0.035 | 0.043 | 0.9 | 1.1 |
| D | 0.189 | 0.197 | 4.8 | 5 |
| D1 | 0.189 | 0.019 | 4.8 | 0.49 |
| D2 | 0.150 | 0.165 | 3.8 | 4.2 |
| E | 0.222 | 0.201 | 5.65 | 5.1 |
| E1 | 0.228 | 0.244 | 5.8 | 6.2 |
| E2 | 0.130 | 0.144 | 3.3 | 3.65 |
| K | (1.3) | | (1.3) | |
| e | (1.27) | | (1.27) | |
| b | 0.010 | 0.014 | 0.25 | 0.35 |
| c | 0.008 | 0.012 | 0.2 | 0.3 |
| L | 0.018 | 0.030 | 0.45 | 0.75 |

## 9. Part Marking System




## 10. Package Information

| Part Number | Package | Packing |
|---|---|---|
| XNM83N03DF | PDFN5*6 | Tape&Reel |

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