

**NTS074N03P3H**

N-channel 30V Enhancement Mode Power MOSFET



**VOLTAGE:** 30 Volts

**CURRENT:** 50 Amperes

PDFN3\*3

Marking and Polarity

**FEATURES**

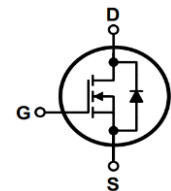
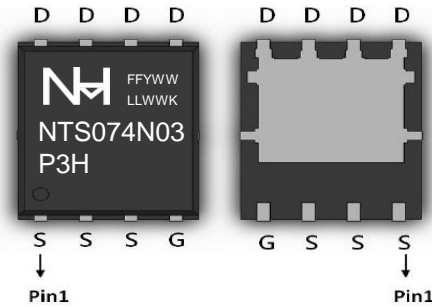
- Advanced trench MOSFET technology
- Low RDS(ON)
- Ultra Low Gate Charge
- RoHS Compliant
- 100% UIS and RG Tested
- High Power and current handing capability

**TYPICAL APPLICATIONS**

- PD Charger V-BUS
- SMPS 2nd Synchronous Rectifier
- MB/VGA Vcore
- BLDC Motor driver
- POL application

**PRODUCT SUMMARY**

|                                |     |    |
|--------------------------------|-----|----|
| $B_{V_{DS}}$ , Min. at Max. Tj | 30  | V  |
| $I_D$                          | 50  | A  |
| $R_{DS(ON)}$ , Max. at Vgs=10V | 7.4 | mΩ |
| Qg, Typ.                       | 16  | nC |



Remark:

- NH=niuhang trademark;
- FF=Product line code, According to actual changes  
YWW=Data code, According to actual changes  
LLWWF=Internal code, According to actual changes
- NTS074N03P3H=Model.

**Absolute Maximum Ratings (Ratings at 25°C ambient temperature unless otherwise specified)**

| Parameter                                    | Test Conditions                                      | Symbol    | Ratings    | Unit |
|--|--|-----------|------------|------|
| Drain-Source Voltage                         |  | $V_{DS}$  | 30         | V    |
| Gate-Source Voltage                          |  | $V_{GS}$  | ±20        | V    |
| Continuous Drain Current (Note 1)            | Ta=25°C  | $I_D$     | 50         | A    |
|  | Ta=100°C   |           | 32         |      |
| Drain Current-Pulsed                         | (Note 1)   | $I_{DM}$  | 150        | A    |
| Maximum Power Dissipation                    | Ta=25°C  | $P_D$     | 30         | W    |
| Power Dissipation Derating Factor above 25°C | Ta=100°C   |           | 12         |      |
| Derating Factor                              |  | $D_F$     | 0.24       | W/°C |
| Junction Temperature                         |  | $T_J$     | -55 to 150 | °C   |
| Storage temperature range                    |  | $T_{STD}$ | -55 to 150 | °C   |
| Avalanche Current, Single pulse              | L= 0.1 mH  | $I_{AS}$  | 21         | A    |
| Single Pulse Avalanche Energy                | L=0.1mH, IAS=21A, VDD=15V, RG=25Ω, Starting Tj =25°C | $E_{AS}$  | 22         | mJ   |

**Thermal Characteristics (Ratings at 25°C ambient temperature unless otherwise specified)**

| Parameter                              | Symbol    | Max | Unit |
|--|-----------|-----|------|
| Thermal Resistance Junction to Ambient | $R_{θJA}$ | 110 | °C/W |
| Thermal Resistance Junction-Case       | $R_{θJC}$ | 4.2 | °C/W |

- Notes:
- Repetitive Rating : Pulse width limited by maximum junction temperature
  - The value of  $R_{θJA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25° C.  
The value in any given application depends on the user's specific board design. This transistor is sensitive to electrostatic discharge and should be handled with care.

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| Electrical Characteristics (Ratings at 25°C ambient temperature unless otherwise specified) |              |  |      |      |           |            |
|---|--------------|--|------|------|-----------|------------|
| Parameter   | Symbol       | Test Conditions                                  | Min. | Typ. | Max.      | Unit       |
| <b>Static off Characteristics</b>   |              |  |      |      |           |            |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                        | 30   | -    | -         | V          |
| Drain-Source Leakage Current  | $I_{DSS}$    | $V_{DS}=24V, V_{GS}=0V$                          | -    | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current   | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                      | -    | -    | $\pm 100$ | nA         |
| <b>Static on Characteristics</b>  |              |  |      |      |           |            |
| Gate Threshold Voltage  | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                    | 1.1  | 1.6  | 2.1       | V          |
| Drain-Source On Resistance  | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=8A$                             | -    | 6.2  | 7.4       | m $\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=6A$                            | -    | 8.5  | 10.0      |            |
| Forward Transconductance  | $g_{FS}$     | $V_{DS}=5V, I_D=8A$                              | -    | 12   | -         | S          |
| <b>Dynamic Characteristics</b>  |              |  |      |      |           |            |
| Input Capacitance   | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V, f=1.0MHz$                | -    | 1000 | -         | pF         |
| Output Capacitance  | $C_{oss}$    |  | -    | 150  | -         | pF         |
| Reverse Transfer Capacitance  | $C_{rss}$    |  | -    | 120  | -         | pF         |
| <b>Switching Parameters</b>   |              |  |      |      |           |            |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{DS}=20V, I_D=20A, V_{GS}=10V, R_G=1.6\Omega$ | -    | 6    | -         | ns         |
| Turn-On Rise Time   | $t_r$        |  | -    | 22   | -         | ns         |
| Turn-Off Delay Time   | $t_{d(off)}$ |  | -    | 48   | -         | ns         |
| Turn-Off Rise Time  | $t_f$        |  | -    | 20   | -         | ns         |
| Gate Resistance   | $R_g$        | $V_{DS}=0V, V_{GS}=0V, f=1.0MHz$                 | -    | 3.50 | -         | $\Omega$   |
| Total Gate Charge   | $Q_g$        | $V_{DS}=25V, I_D=8A, V_{GS}=10V$                 | -    | 30   | -         | nC         |
| Gate-Source Charge  | $Q_{gs}$     |  | -    | 2    | -         | nC         |
| Gate-Drain Charge   | $Q_{gd}$     |  | -    | 9.0  | -         | nc         |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>                               |              |  |      |      |           |            |
| Max. Diode Forward Current  | $I_{SD}$     |  | -    | -    | 50        | A          |
| Max. Pulsed Forward Current   | $I_{SM}$     |  | -    | -    | 150       | A          |
| Diode Forward Voltage   | $V_{SD}$     | $V_{GS}=0V, I_S=10A$                             | -    | 0.70 | 1.1       | V          |
| Reverse Recovery Time   | $t_{rr}$     | $I_F=8A, di/dt=100A/\mu s$                       | -    | 14   | -         | ns         |
| Reverse Recovery Charge   | $Q_{rr}$     |  | -    | 6    | -         | $\mu C$    |

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Typical Characteristics Curves

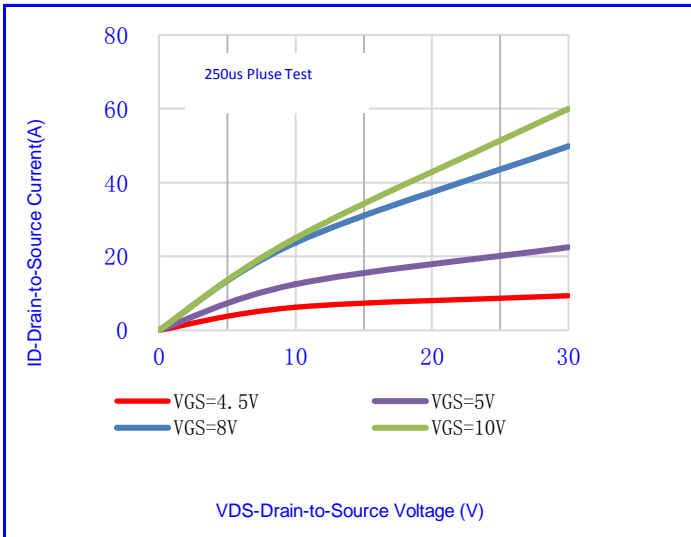


Fig.1-Output Characteristics

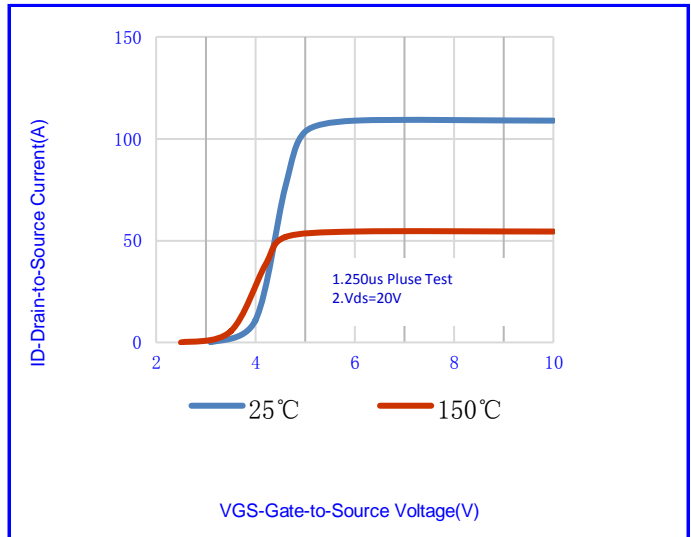


Fig.2- Transfer Characteristics

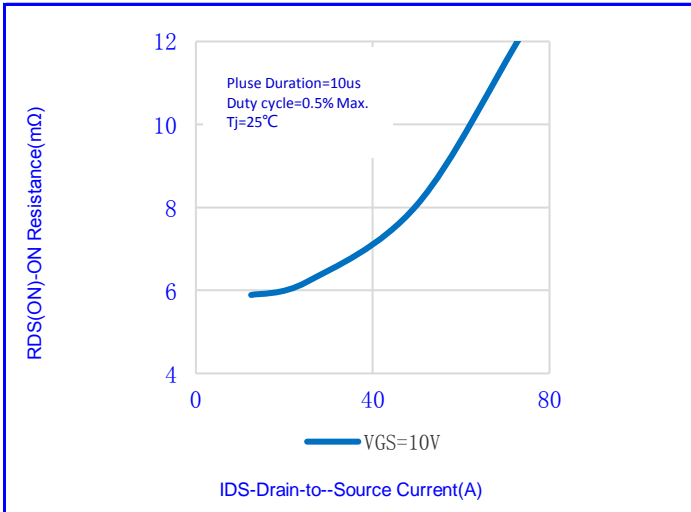


Fig.3- On Resistance vs. Drain Current

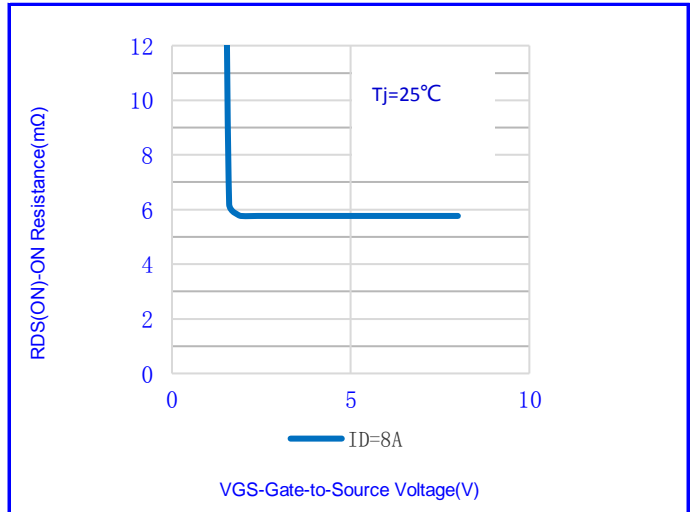


Fig.4- On Resistance vs. Gate Source Voltage

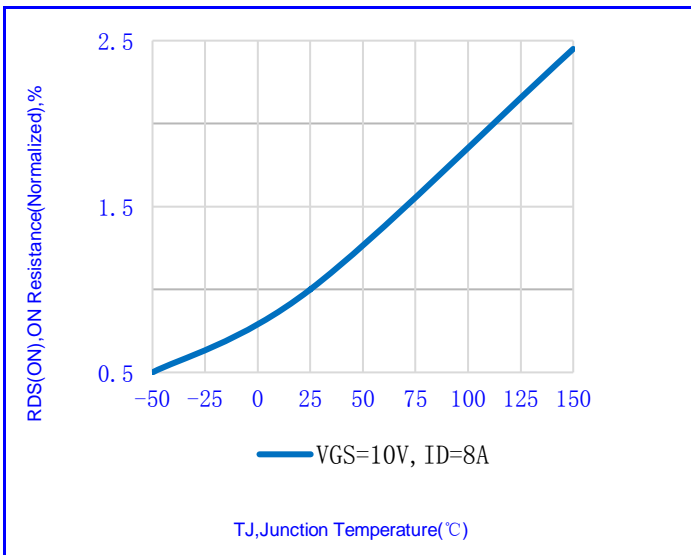


Fig.5- On Resistance vs. Junction Temperature

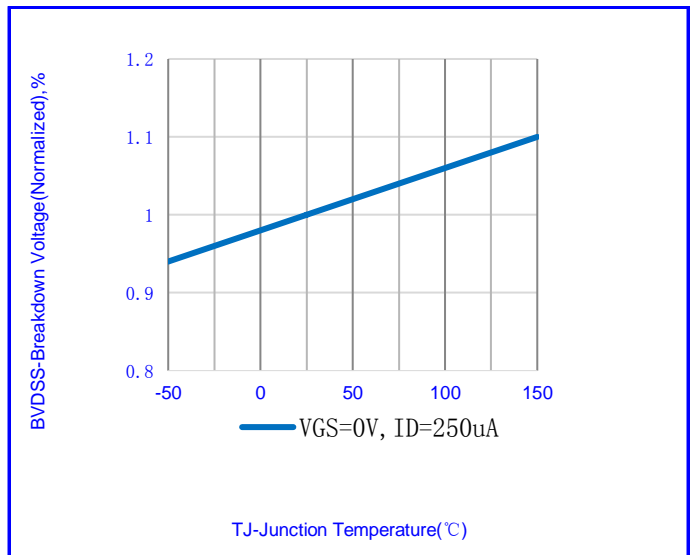


Fig.6- Breakdown Voltage vs. Junction Temperature

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Typical Characteristics Curves

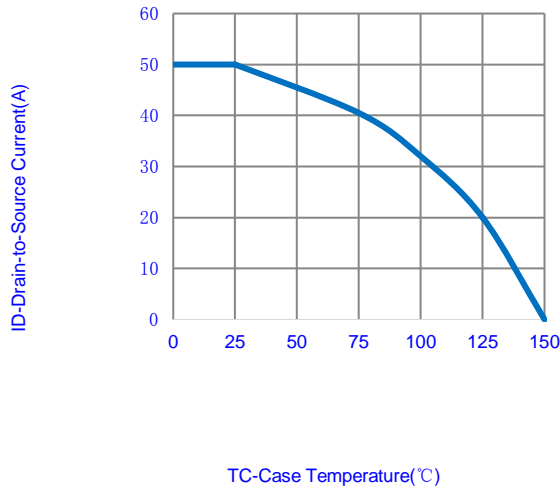


Fig.7-Maximum Continuous Drain Current vs. Case Temperature

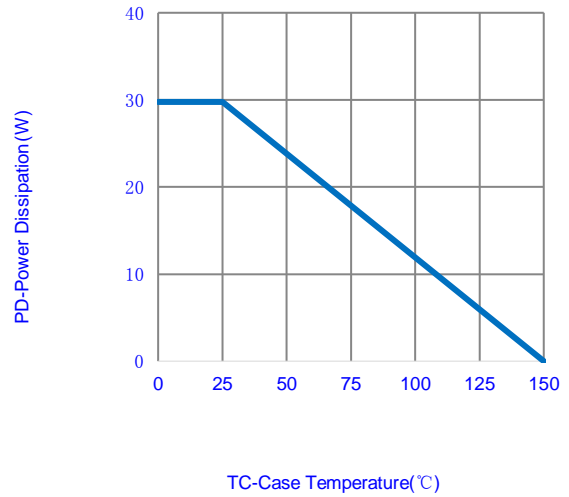


Fig.8-Maximum Power Dissipation vs. Case Temperature

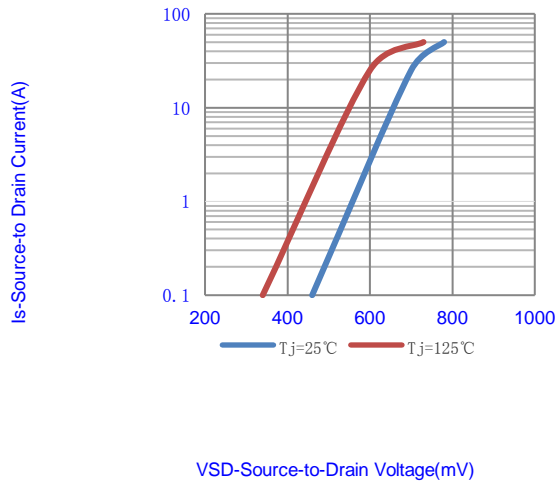


Fig.9- Source-Drain Diode Forward Voltage

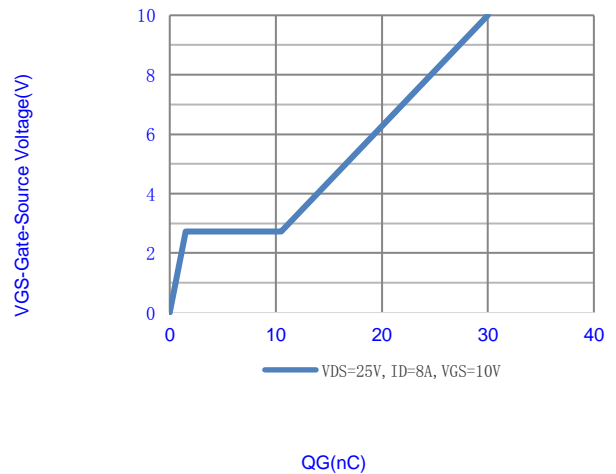


Fig.10-Gate Charge Waveform

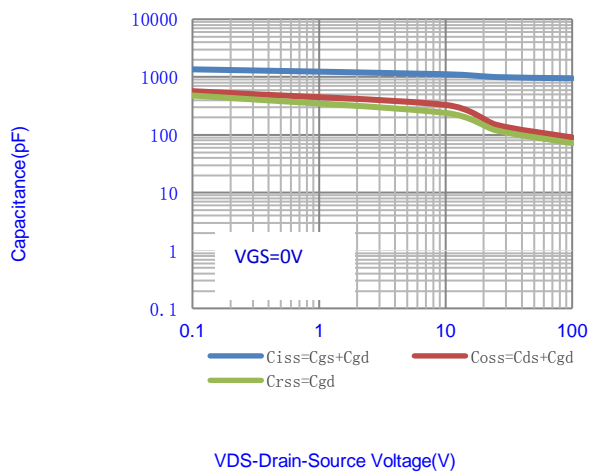


Fig.11- Gate-Source Voltage-VGS(V)

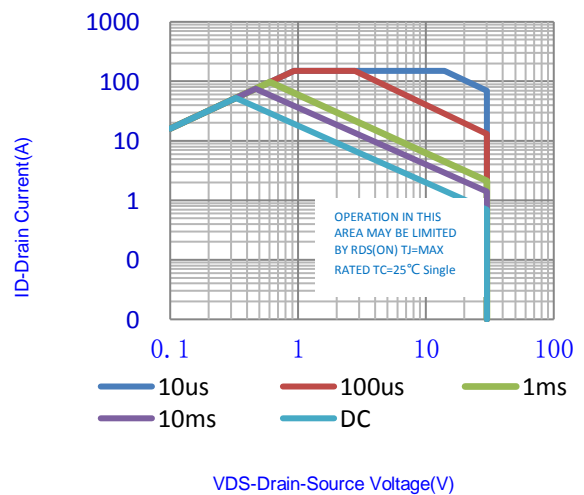


Fig.12-Maximum Safe Operating Area(SOA)

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Typical Characteristics Curves

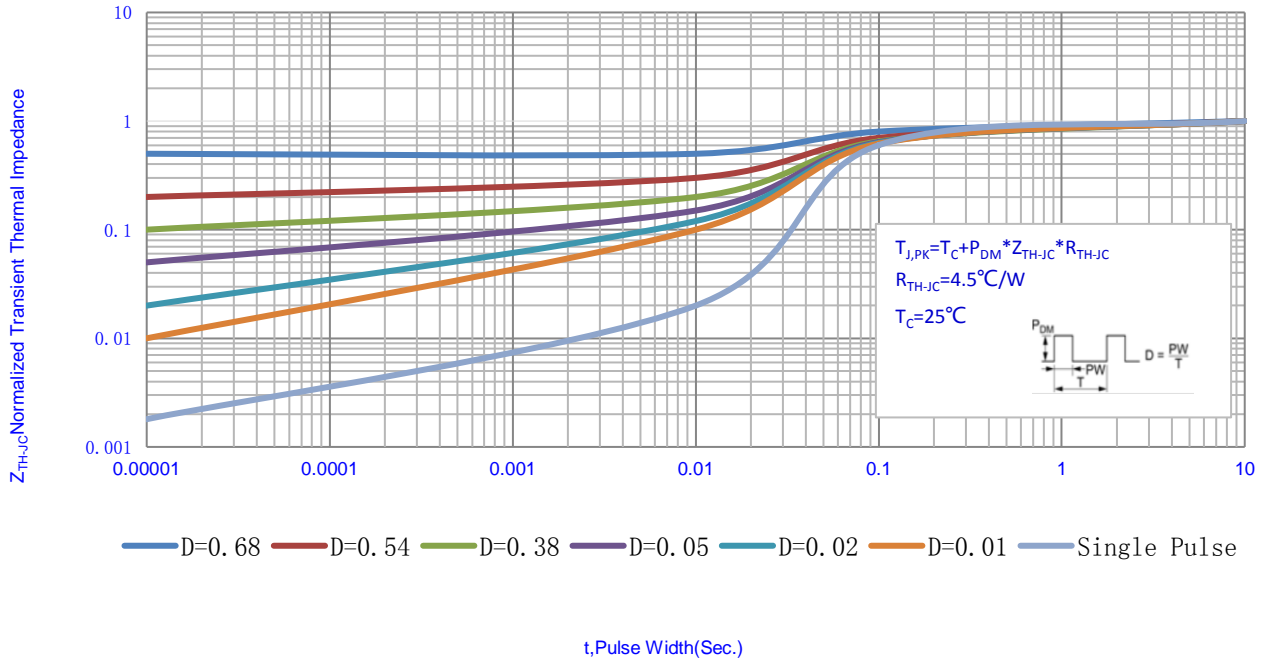


Fig.13- Normalized Transient Thermal Impedance vs. Pulse Width

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Test Circuit & Waveform

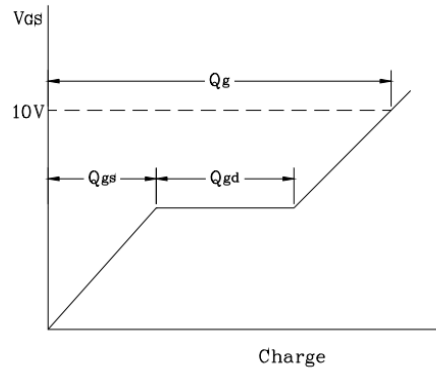
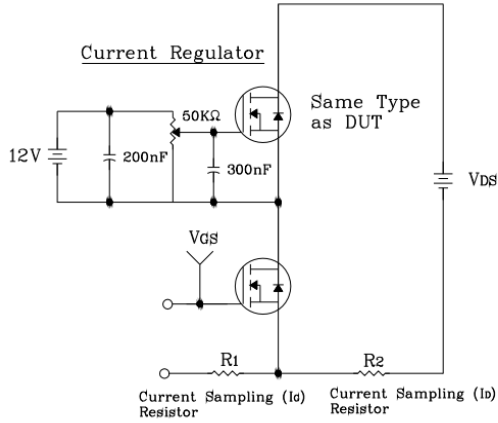


Fig.12-Gate Charge Test Circuit & Waveform

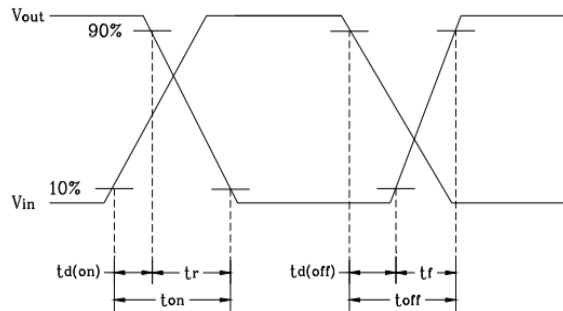
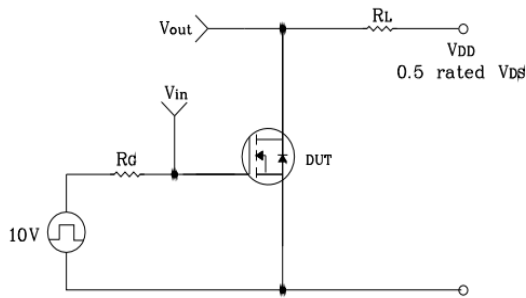


Fig.13- Resistive Switching Test Circuit & Waveform

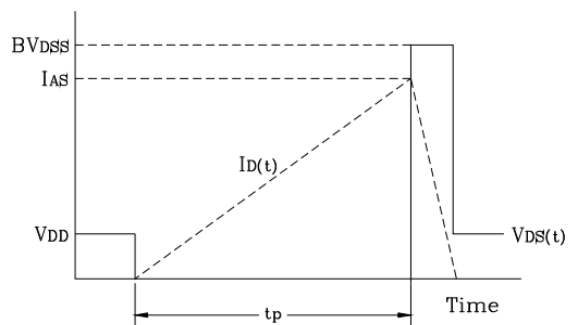
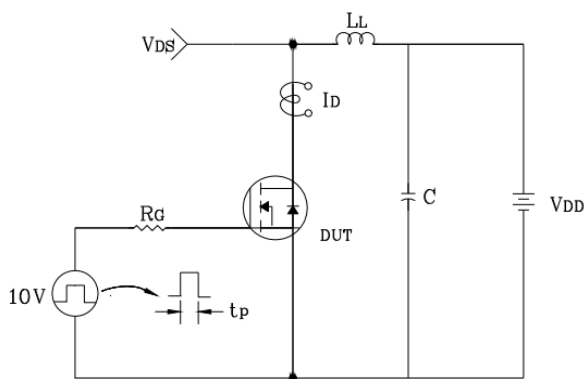


Fig.14- EAS Test Circuit & Waveform

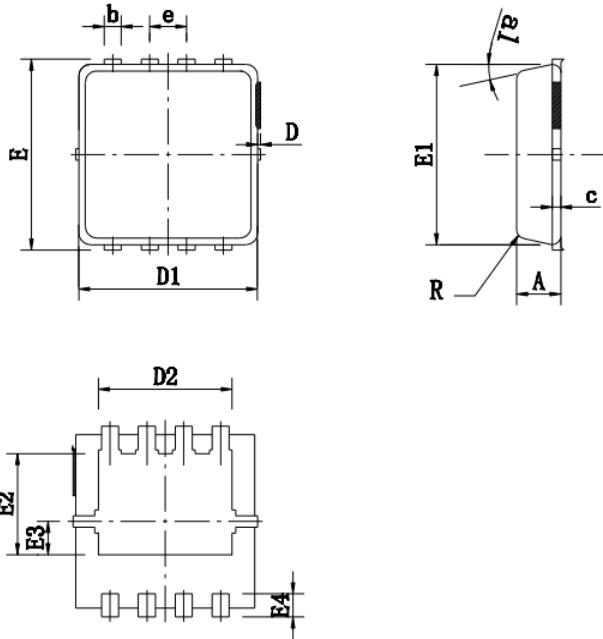
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OUTLINE DRAWINGS

PDFN3\*3



OUTLINE DIMENSIONS

| Dim. | Millimeters |       |       | Inches |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 0.750       | 0.780 | 0.810 | 0.030  | 0.031 | 0.032 |
| b    | 0.297       | 0.300 | 0.350 | 0.012  | 0.012 | 0.014 |
| c    | -           | 0.152 | -     | -      | 0.006 | -     |
| D    | 0.000       | 0.050 | 0.100 | 0.000  | 0.002 | 0.004 |
| D1   | 3.120       | 3.150 | 3.180 | 0.123  | 0.124 | 0.125 |
| D2   | -           | 2.350 | -     | -      | 0.093 | -     |
| E    | 3.200       | 3.300 | 3.400 | 0.126  | 0.130 | 0.134 |
| E1   | 3.090       | 3.120 | 3.150 | 0.122  | 0.123 | 0.124 |
| E2   | -           | 1.750 | -     | -      | 0.069 | -     |
| E3   | -           | 0.575 | -     | -      | 0.023 | -     |
| E4   | -           | 0.400 | -     | -      | 0.016 | -     |
| R    | -           | 0.150 | -     | -      | 0.006 | -     |
| e    | -           | 0.650 | -     | -      | 0.026 | -     |
| a1   | -           | 12°   | -     | -      | 12°   | -     |

PACKING INFORMATION

PDFN3\*3

| Package Method | Reel Size (mm) | Quantity (pcs/reel) | Inner Box Size LxWxH(mm) | Quantity (pcs/Inner Box) | Outer Carton Size LxWxH(mm) | Quantity (pcs/carton) |
|----------------|----------------|---------------------|--------------------------|--------------------------|-----------------------------|-----------------------|
| Tape Reel      | Φ330           | 5000                | 340x340x50               | 10000                    | 360x360x260                 | 50000                 |

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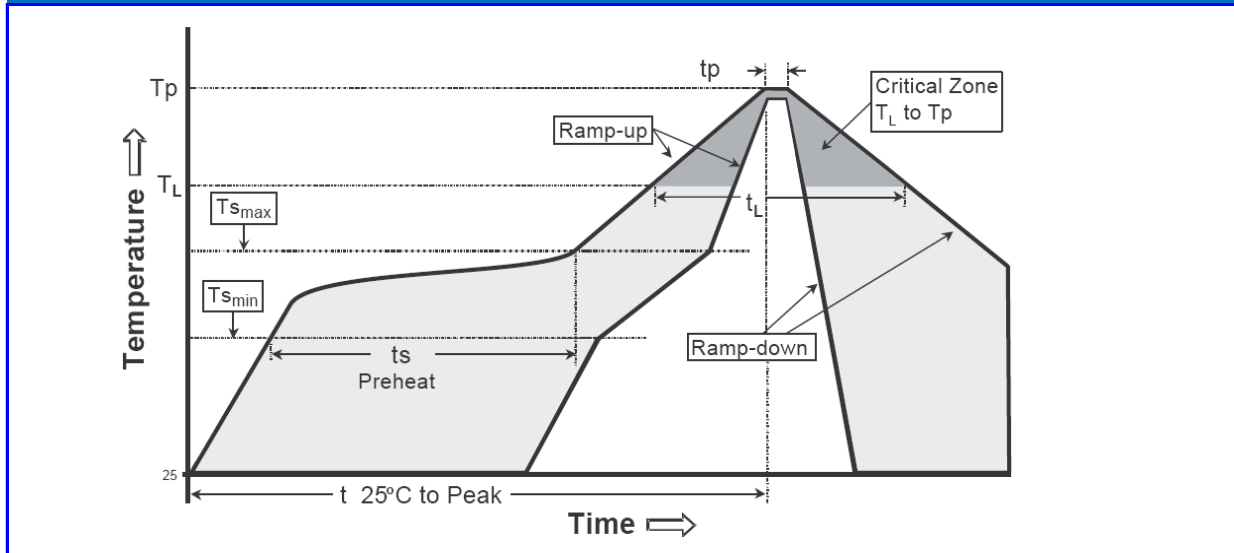
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**Recommended wave soldering condition**

|                 |                  |                 |
|-----------------|------------------|-----------------|
| Product         | Peak Temperature | Soldering Time  |
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

**Recommended temperature profile for IR reflow**



| Profile feature  | Sn-Pb eutectic Assembly          | Pb-free Assembly                 |
|--|----------------------------------|----------------------------------|
| Average ramp-up rate (Tsmmax to Tp)  | 3°C/second max.                  | 3°C/second max.                  |
| Preheat<br>-Temperature Min(TS min)<br>-Temperature Max(TS max)<br>-Time(ts min to ts max) | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
| Time maintained above:<br>-Temperature (TL)<br>- Time (tL)                                 | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
| Peak Temperature(TP)   | 240 +0/-5 °C                     | 260 +0/-5 °C                     |
| Time within 5°C of actual peak temperature(tp)   | 10-30 seconds                    | 20-40 seconds                    |
| Ramp down rate   | 6°C/second max.                  | 6°C/second max.                  |
| Time 25 °C to peak temperature   | 6 minutes max.                   | 8 minutes max.                   |

Note : All temperatures refer to topside of the package, measured on the package body surface.



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