

**NSS085N100C**

N-channel 100V Enhancement Mode Power MOSFET



**VOLTAGE:** 100 Volts

**CURRENT:** 100 Amperes

PDFN5\*6

Marking and Polarity

**FEATURES**

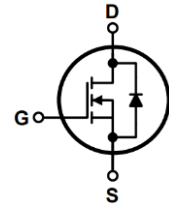
- Advanced trench MOSFET technology
- Low RDS(ON)
- Ultra Low Gate Charge
- RoHS Compliant
- 100% UIS and RG Tested
- High Power and current handing capability

**TYPICAL APPLICATIONS**

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

**PRODUCT SUMMARY**

|                                                    |     |    |
|----------------------------------------------------|-----|----|
| B <sub>VDSS</sub> , Min. at Max. T <sub>j</sub>    | 100 | V  |
| I <sub>D</sub>                                     | 100 | A  |
| R <sub>DS(ON)</sub> , Max. at V <sub>GS</sub> =10V | 9.5 | mΩ |
| Q <sub>g</sub> , Typ.                              | 43  | 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
- NSS085N100C=Model.

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

| Parameter                                    | Test Conditions                                                                               | Symbol           | Ratings    | Unit |
|----------------------------------------------|-----------------------------------------------------------------------------------------------|------------------|------------|------|
| Drain-Source Voltage                         |                                                                                               | V <sub>DS</sub>  | 100        | V    |
| Gate-Source Voltage                          |                                                                                               | V <sub>GS</sub>  | ±20        | V    |
| Continuous Drain Current (Note 1)            | Ta=25°C<br>Ta=100°C                                                                           | I <sub>D</sub>   | 100<br>64  | A    |
| Drain Current-Pulsed (Note 1)                |                                                                                               | I <sub>DM</sub>  | 300        | A    |
| Maximum Power Dissipation                    | Ta=25°C                                                                                       | P <sub>D</sub>   | 150        | W    |
| Power Dissipation Derating Factor above 25°C | Ta=100°C                                                                                      |                  | 60         |      |
| Derating Factor                              |                                                                                               | D <sub>F</sub>   | 1.20       | W/°C |
| Junction Temperature                         |                                                                                               | T <sub>J</sub>   | -55 to 150 | °C   |
| Storage temperature range                    |                                                                                               | T <sub>STD</sub> | -55 to 150 | °C   |
| Avalanche Current, Single pulse              | L= 0.5 mH                                                                                     | I <sub>AS</sub>  | 38         | A    |
| Single Pulse Avalanche Energy                | L=0.5mH, I <sub>AS</sub> =38A, V <sub>DD</sub> =50V,<br>RG=25Ω, Starting T <sub>J</sub> =25°C | E <sub>AS</sub>  | 361        | mJ   |

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

| Parameter                                 | Symbol           | Max  | Unit |
|-------------------------------------------|------------------|------|------|
| Thermal Resistance Junction to Ambient    | R <sub>θJA</sub> | 50   | °C/W |
| Thermal Resistance Junction-Case (Note 2) | R <sub>θJC</sub> | 0.84 | °C/W |

Notes:

- Repetitive Rating : Pulse width limited by maximum junction temperature
- The value of R<sub>θJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =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 |
|--------------------------------------------------------|---------------------|---------------------------------|------|------|------|------|
| Static off Characteristics                             |                     |                                 |      |      |      |      |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>   | VGS=0V,ID=250uA                 | 100  | -    | -    | V    |
| Drain-Source Leakage Current                           | I <sub>DSS</sub>    | VDS=60V,VGS=0V                  | -    | -    | 1    | uA   |
| Gate-Body Leakage Current                              | I <sub>GSS</sub>    | VGS=±20V,VDS=0V                 | -    | -    | ±100 | nA   |
| Static on Characteristics                              |                     |                                 |      |      |      |      |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub> | VGS=VDS,ID=250uA                | 1.0  | 2.0  | 3.0  | V    |
| Drain-Source On Resistance                             | R <sub>DS(ON)</sub> | VGS=10V,ID=2A                   | -    | 7.5  | 11.0 | mΩ   |
|                                                        |                     | VGS=4.5V,ID=2A                  | -    | 11.0 | 14.5 |      |
| Forward Transconductance                               | g <sub>FS</sub>     | VDS=5V,ID=10A                   | -    | 12   | -    | S    |
| Dynamic Characteristics                                |                     |                                 |      |      |      |      |
| Input Capacitance                                      | C <sub>iss</sub>    | VDS=35V,VGS=0V,<br>f=1.0MHz     | -    | 2000 | -    | pF   |
| Output Capacitance                                     | C <sub>oss</sub>    |                                 | -    | 820  | -    | pF   |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    |                                 | -    | 80   | -    | pF   |
| Switching Paramters                                    |                     |                                 |      |      |      |      |
| Turn-On Delay Time                                     | t <sub>d(on)</sub>  | VDS=0V,ID=50A,<br>VGS=10V,RG=3Ω | -    | 9    | -    | ns   |
| Turn-On Rise Time                                      | t <sub>r</sub>      |                                 | -    | 7    | -    | ns   |
| Turn-Off Delay Time                                    | t <sub>d(off)</sub> |                                 | -    | 50   | -    | ns   |
| Turn-Off Rise Time                                     | t <sub>f</sub>      |                                 | -    | 11   | -    | ns   |
| Gate Resistance                                        | R <sub>g</sub>      | VDS=0V,VGS=0V,f=1.0MHz          | -    | 1.0  | -    | Ω    |
| Total Gate Charge                                      | Q <sub>g</sub>      | VDS=50V,ID=50A,VGS=10V          | -    | 43   | -    | nC   |
| Gate-Source Charge                                     | Q <sub>gs</sub>     |                                 | -    | 6.5  | -    | nC   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     |                                 | -    | 8.0  | -    | nc   |
| Drain-Source Diode Characteristics and Maximum Ratings |                     |                                 |      |      |      |      |
| Max. Diode Forward Cuurent                             | I <sub>SD</sub>     |                                 | -    | -    | 100  | A    |
| Max. Pulsed Forward Cuurent                            | I <sub>SM</sub>     |                                 | -    | -    | 300  | A    |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | VGS=0V,IS=10A                   | -    | 0.8  | 1.2  | V    |
| Reverse Recovery Time                                  | t <sub>rr</sub>     | IF=20A,di/dt=500A/us            | -    | 27   | -    | ns   |
| Reverse Recovery Charge                                | Q <sub>rr</sub>     |                                 | -    | 113  | -    | μC   |

# NSS085N100C

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## Typical Characteristics Curves

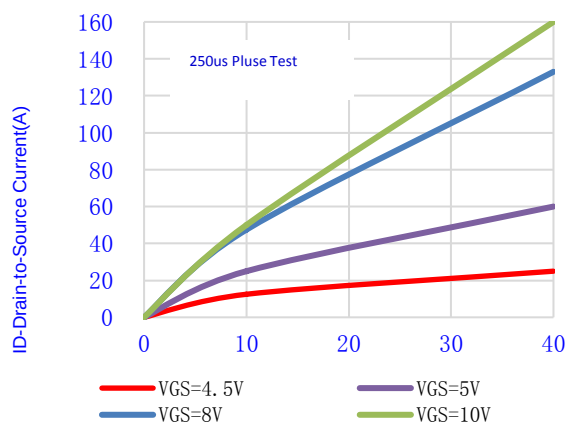


Fig.1-Output Characteristics

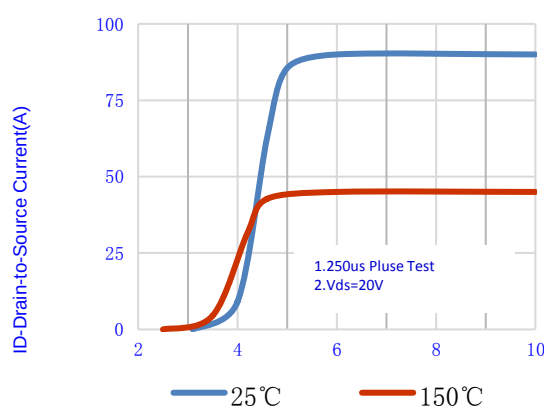


Fig.2- Transfer Characteristics

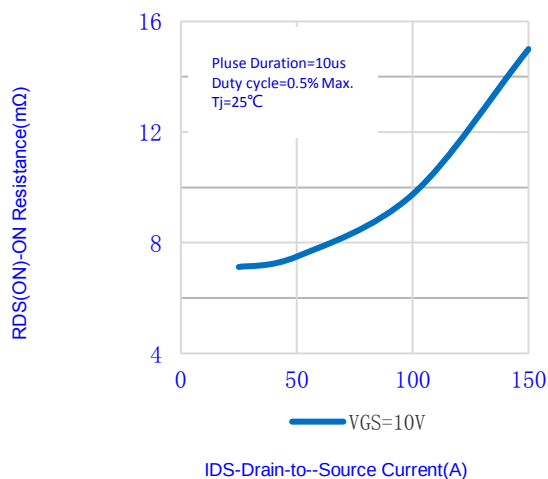


Fig.3- On Resistance vs. Drain Current

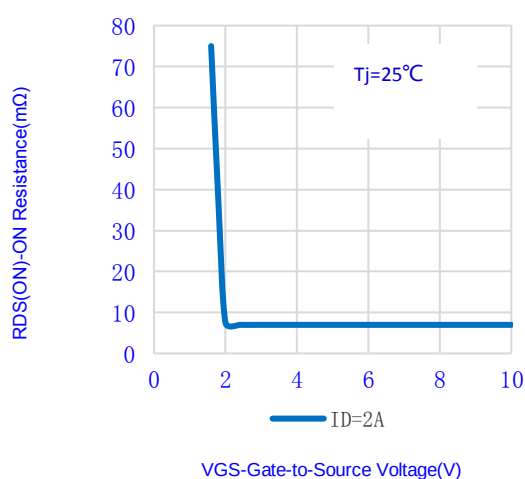


Fig.4- On Resistance vs. Gate Source Voltage

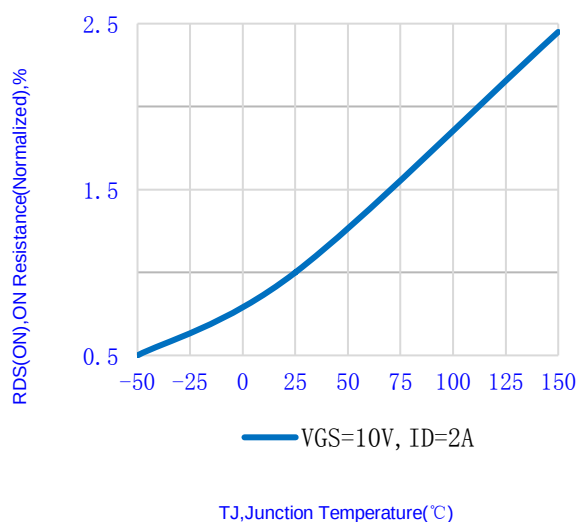


Fig.5-On Resistance vs. Junction Temperature

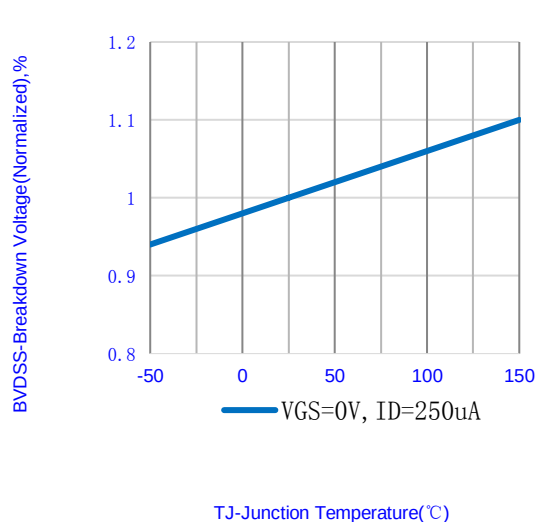


Fig.6- Breakdown Voltage vs. Junction Temperature

# NSS085N100C

N-channel 100V Enhancement Mode Power MOSFET



## Typical Characteristics Curves

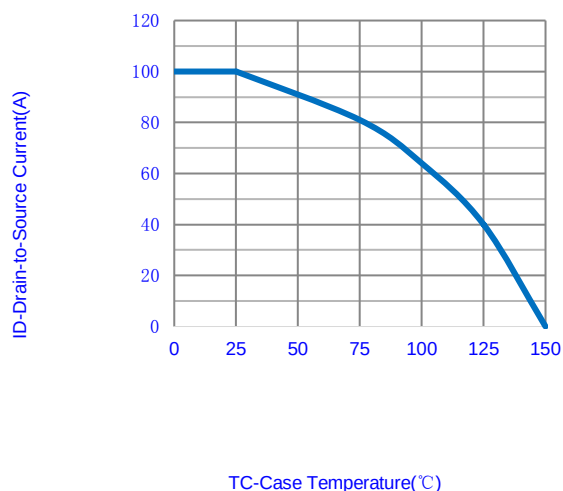


Fig.7-Maximum Continuous Drain Current vs. Case Temperature

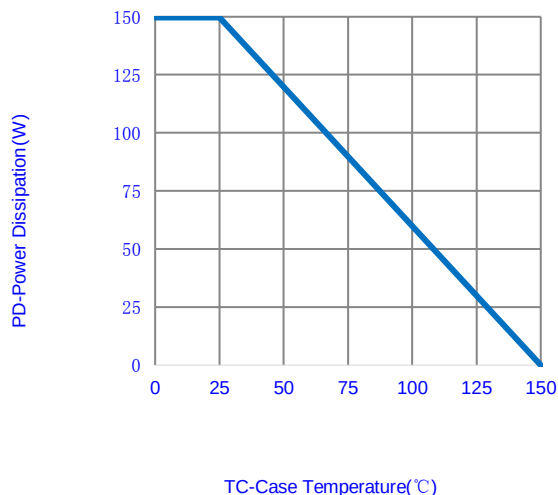


Fig.8-Maximum Power Dissipation vs. Case Temperature

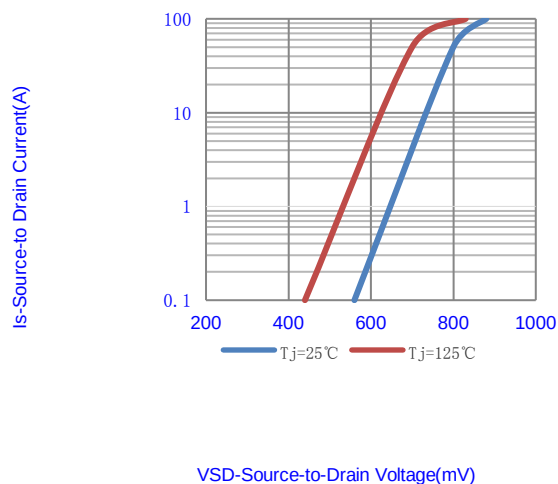


Fig.9- Source-Drain Diode Forward Voltage

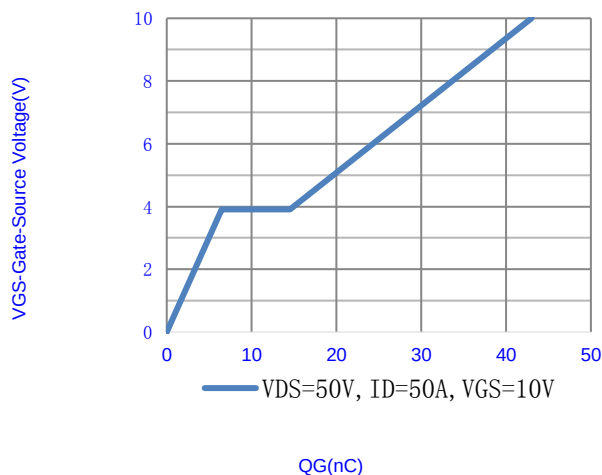


Fig.10-Gate Charge Waveform

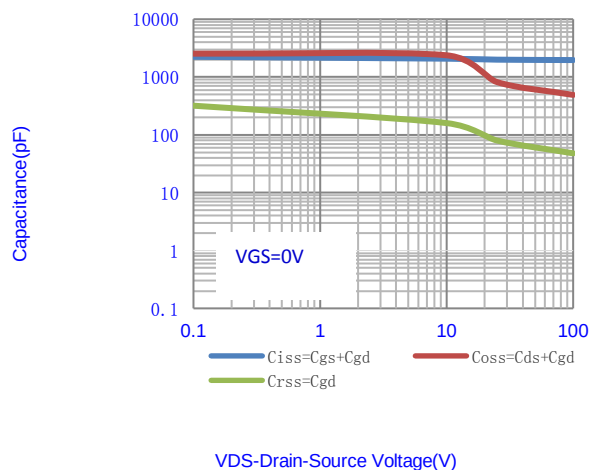


Fig.11- Gate-Source Voltage-VGS(V)

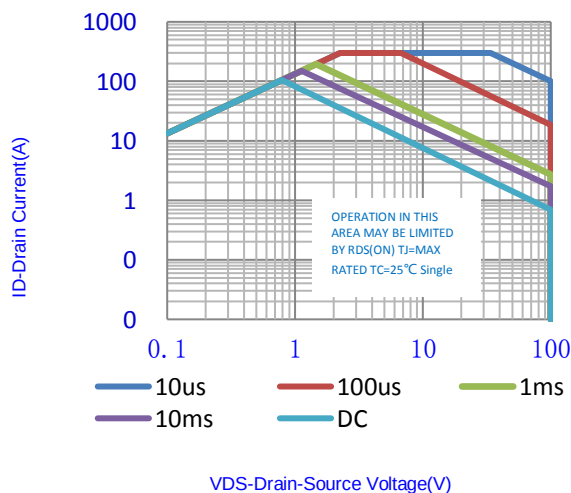


Fig.12-Maximum Safe Operating Area(SOA)

# NSS085N100C

N-channel 100V Enhancement Mode Power MOSFET



## Typical Characteristics Curves

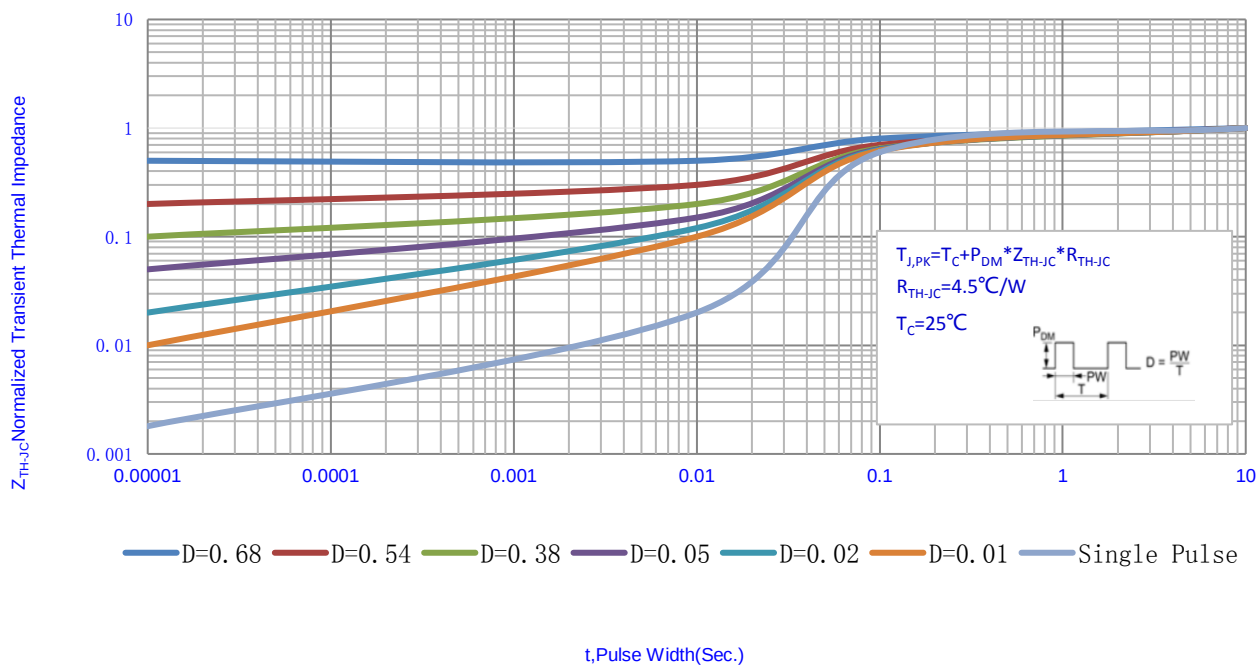


Fig.13- Normalized Transient Thermal Impedance vs. Pulse Width

# NSS085N100C

N-channel 100V Enhancement Mode Power MOSFET



## Test Circuit & Waveform

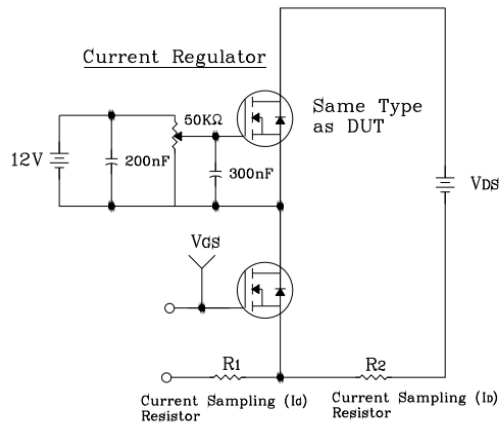


Fig.12- Gate Charge Test Circuit & Waveform

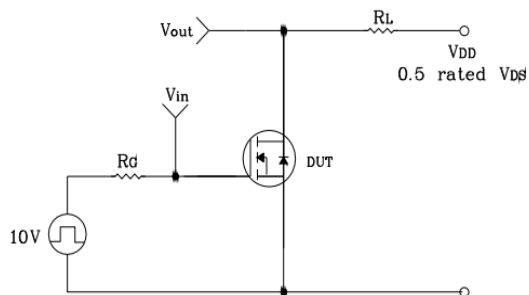


Fig.13- Resistive Switching Test Circuit & Waveform

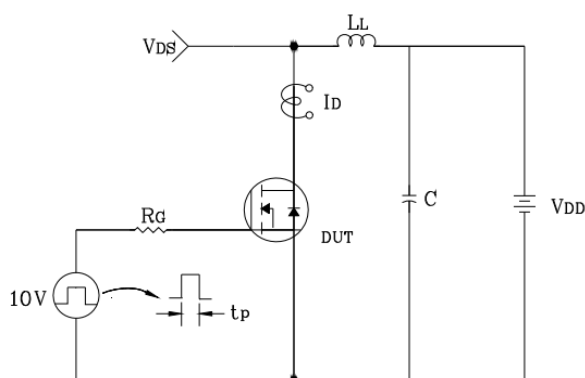


Fig.14- EAS Test Circuit & Waveform

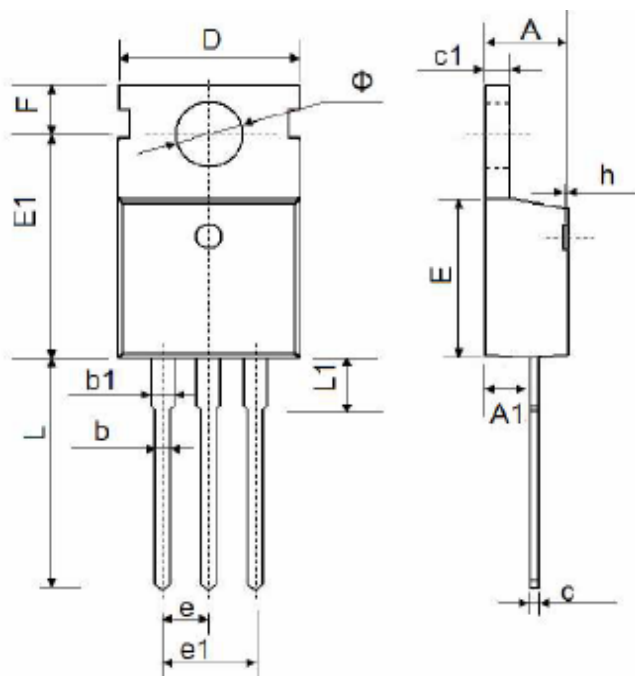
# NSS085N100C

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## OUTLINE DRAWINGS

PDFN5\*6



## OUTLINE DIMENSIONS

| Dim. | Milimeters |      |       | Inches |      |      |
|------|------------|------|-------|--------|------|------|
|      | Min.       | Typ. | Max.  | Min.   | Typ. | Max. |
| A    | 4.40       | -    | 4.60  | 0.17   | -    | 0.18 |
| A1   | 2.00       | -    | 2.50  | 0.08   | -    | 0.10 |
| b    | 0.70       | -    | 0.90  | 0.03   | -    | 0.04 |
| b1   | 1.10       | -    | 1.40  | 0.04   | -    | 0.06 |
| c    | 0.40       | -    | 0.70  | 0.02   | -    | 0.03 |
| c1   | 1.20       | -    | 1.40  | 0.05   | -    | 0.06 |
| D    | 9.90       | -    | 10.40 | 0.39   | -    | 0.41 |
| E    | 8.90       | -    | 9.80  | 0.35   | -    | 0.39 |
| E1   | 12.50      | -    | 12.95 | 0.49   | -    | 0.51 |
| e    | -          | 2.54 | -     | -      | 0.10 | -    |
| e1   | 4.90       | -    | 5.20  | 0.19   | -    | 0.20 |
| F    | 2.65       | -    | 3.00  | 0.10   | -    | 0.12 |
| h    | 0.00       | -    | 0.30  | 0.00   | -    | 0.01 |
| L    | 12.90      | -    | 13.40 | 0.51   | -    | 0.53 |
| L1   | 2.80       | -    | 3.40  | 0.11   | -    | 0.13 |
| Φ    | 3.40       | -    | 3.80  | 0.13   | -    | 0.15 |

## PACKING INFORMATION

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| Package Method | Reel Size (mm) | Quantity (pcs/reel) | Inner Box Size L×W×H(mm) | Quantity (pcs/Inner Box) | Outer Carton Size L×W×H(mm) | Quantity (pcs/carton) |
|----------------|----------------|---------------------|--------------------------|--------------------------|-----------------------------|-----------------------|
| Tape Reel      | Φ330           | 2500                | 340×340×50               | 5000                     | 360×360×260                 | 25000                 |

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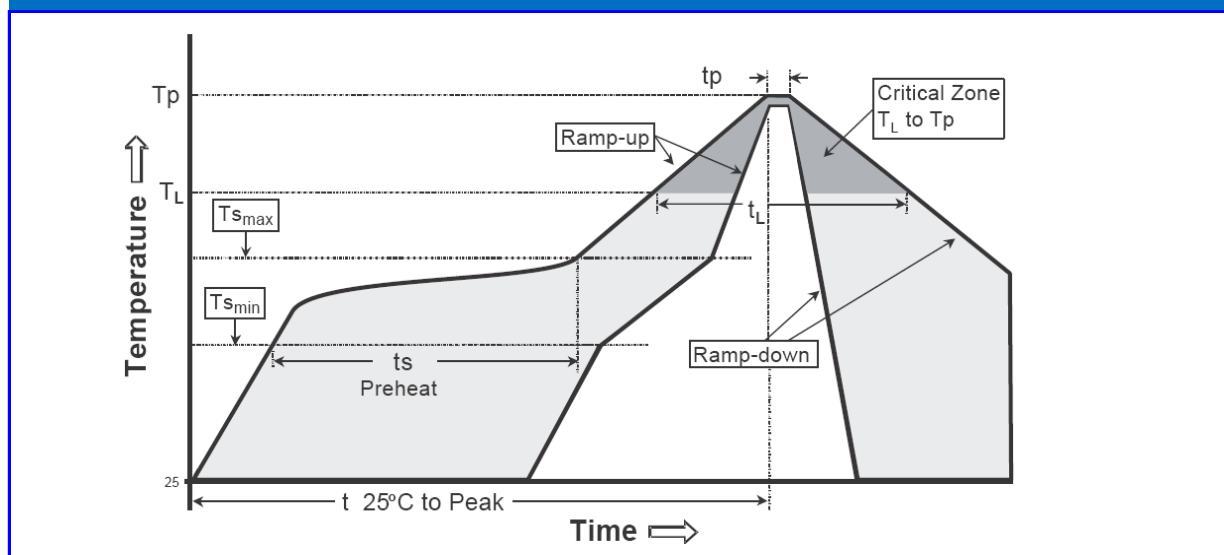
N-channel 100V Enhancement Mode Power MOSFET



**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<br>(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<br>temperature(tp)                                          | 10-40 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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