

# MOSFET – N-Channel, UniFET™

200 V, 16 A, 125 mΩ

## FDD18N20LZ

### Description

UniFET MOSFET is ON Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.

### Features

- $R_{DS(on)} = 125 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 8 \text{ A}$
- Low Gate Charge (Typ. 30 nC)
- Low  $C_{RSS}$  (Typ. 25 pF)
- 100% Avalanche Tested
- Improved  $dv/dt$  Capability
- ESD Improved Capability
- This Device is Pb-Free and is RoHS Compliant

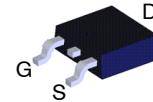
### Applications

- LED TV
- Consumer Appliances
- Uninterruptible Power Supply



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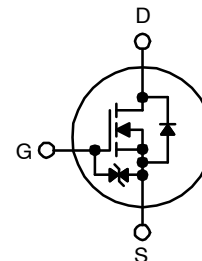


DPAK3 (TO-252 3 LD)  
CASE 369AS

### MARKING DIAGRAM



FDD18N20LZ = Specific Device Code  
\$Y = ON Semiconductor Logo  
&Z = Assembly Plant Code  
&3 = 3-Digit Date Code  
&K = 2-Digits Lot run Traceability Code



N-Channel MOSFET

### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

# FDD18N20LZ

## MOSFET MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol         | Parameter  | FDD18N20LZ                               | Unit             |
|----------------|--|--|------------------|
| $V_{DSS}$      | Drain to Source Voltage  | 200                                      | V                |
| $V_{GSS}$      | Gate to Source Voltage   | $\pm 20$                                 | V                |
| $I_D$          | Drain Current  | Continuous ( $T_C = 25^\circ\text{C}$ )  | 16               |
|                |  | Continuous ( $T_C = 100^\circ\text{C}$ ) | 9.6              |
| $I_{DM}$       | Drain Current (Note 1)   | Pulsed                                   | 64               |
| $E_{AS}$       | Single Pulsed Avalanche Energy (Note 2)                              | 320                                      | mJ               |
| $I_{AR}$       | Avalanche Current (Note 1)   | 16                                       | A                |
| $E_{AR}$       | Repetitive Avalanche Energy (Note 1)                                 | 8.9                                      | mJ               |
| dv/dt          | Peak Diode Recovery dv/dt (Note 3)                                   | 10                                       | V/ns             |
| $P_D$          | Power Dissipation  | ( $T_C = 25^\circ\text{C}$ )             | 89               |
|                |  | Derate above $25^\circ\text{C}$          | 0.7              |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                              | -55 to +150                              | $^\circ\text{C}$ |
| $T_L$          | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds | 300                                      | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2.  $L = 2.5\text{ mH}$ ,  $I_{AS} = 16\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $R_G = 25\ \Omega$ , starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{SD} \leq 16\text{ A}$ ,  $di/dt \leq 200\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$ .

## THERMAL CHARACTERISTICS

| Symbol          | Parameter                                     | FDD18N20LZ | Unit                      |
|-----------------|---|------------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max.    | 1.4        | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max. | 83         |                           |

# FDD18N20LZ

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|--------|-----------|----------------|-----|-----|-----|------|
|--------|-----------|----------------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                    |   |   |     |     |     |      |
|------------------------------------|---|---|-----|-----|-----|------|
| BV <sub>DSS</sub>                  | Drain to Source Breakdown Voltage         | I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 25°C | 200 | –   | –   | V    |
| ΔBV <sub>DSS</sub> / Δ             | Breakdown Voltage Temperature Coefficient | I <sub>D</sub> = 250 μA, Referenced to 25°C                           | –   | 0.2 | –   | V/°C |
| T <sub>J</sub><br>I <sub>DSS</sub> | Zero Gate Voltage Drain Current           | V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V                        | –   | –   | 1   | μA   |
|                                    |   | V <sub>DS</sub> = 160 V, T <sub>C</sub> = 125°C                       | –   | –   | 10  |      |
| I <sub>GSS</sub>                   | Gate to Body Leakage Current              | V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V                        | –   | –   | ±10 | μA   |

### ON CHARACTERISTICS

|                     |                                      |   |     |      |       |   |
|---------------------|--------------------------------------|---|-----|------|-------|---|
| V <sub>GS(th)</sub> | Gate Threshold Voltage               | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA | 1.0 | –    | 2.5   | V |
| R <sub>DS(on)</sub> | Static Drain to Source On Resistance | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 8 A                | –   | 0.10 | 0.125 | Ω |
|                     |                                      | V <sub>GS</sub> = 5 V, I <sub>D</sub> = 8 A                 | –   | 0.11 | 0.13  |   |
| g <sub>FS</sub>     | Forward Transconductance             | V <sub>DS</sub> = 20 V, I <sub>D</sub> = 2 A                | –   | 11   | –     | S |

### DYNAMIC CHARACTERISTICS

|                     |                               |  |   |      |      |    |
|---------------------|-------------------------------|--|---|------|------|----|
| C <sub>iss</sub>    | Input Capacitance             | V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V<br>f = 1 MHz                         | – | 1185 | 1575 | pF |
| C <sub>oss</sub>    | Output Capacitance            |  | – | 190  | 255  | pF |
| C <sub>rss</sub>    | Reverse Transfer Capacitance  |  | – | 25   | 40   | pF |
| Q <sub>g(tot)</sub> | Total Gate Charge at 10V      | V <sub>DS</sub> = 200 V, I <sub>D</sub> = 16 A, V <sub>GS</sub> = 10 V<br>(Note 4) | – | 30   | 40   | nC |
| Q <sub>gs</sub>     | Gate to Source Gate Charge    |  | – | 3.5  | –    | nC |
| Q <sub>gd</sub>     | Gate to Drain “Miller” Charge |  | – | 8.5  | –    | nC |

### SWITCHING CHARACTERISTICS

|                     |                     |   |   |     |     |    |
|---------------------|---------------------|---|---|-----|-----|----|
| t <sub>d(on)</sub>  | Turn-On Delay Time  | V <sub>DD</sub> = 100 V, I <sub>D</sub> = 16 A, V <sub>GS</sub> = 10 V,<br>R <sub>G</sub> = 25 Ω (Note 4) | – | 15  | 40  | ns |
| t <sub>r</sub>      | Turn-On Rise Time   |   | – | 20  | 50  | ns |
| t <sub>d(off)</sub> | Turn-Off Delay Time |   | – | 135 | 280 | ns |
| t <sub>f</sub>      | Turn-Off Fall Time  |   | – | 50  | 110 | ns |

### DAIN-SOURCE DIODE CHARACTERISTICS

|                 |  |  |   |     |     |    |
|-----------------|--|--|---|-----|-----|----|
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current |  | – | –   | 16  | A  |
| I <sub>SM</sub> | Maximum Pulsed Drain to Source Diode Forward Current     |  | – | –   | 64  | A  |
| V <sub>SD</sub> | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 4 A                                   | – | –   | 1.4 | V  |
| t <sub>rr</sub> | Reverse Recovery Time                                    | V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 4 A<br>dI <sub>F</sub> /dt = 100 A/μs | – | 105 | –   | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge                                  |  | – | 0.4 | –   | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Essentially independent of operating temperature typical characteristics.

# FDD18N20LZ

## TYPICAL PERFORMANCE CHARACTERISTICS

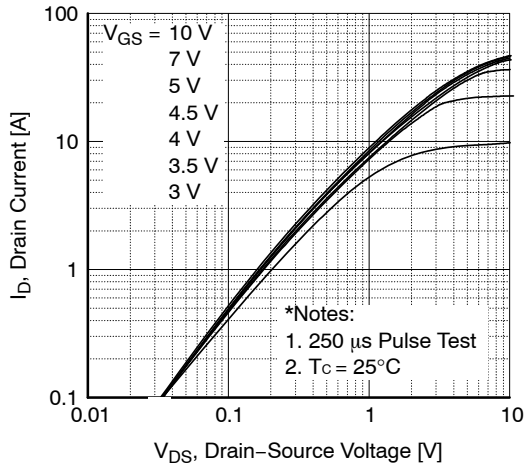


Figure 1. On-Region Characteristics

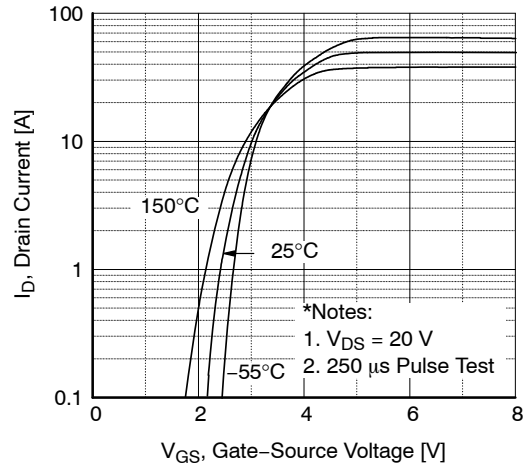


Figure 2. Transfer Characteristics

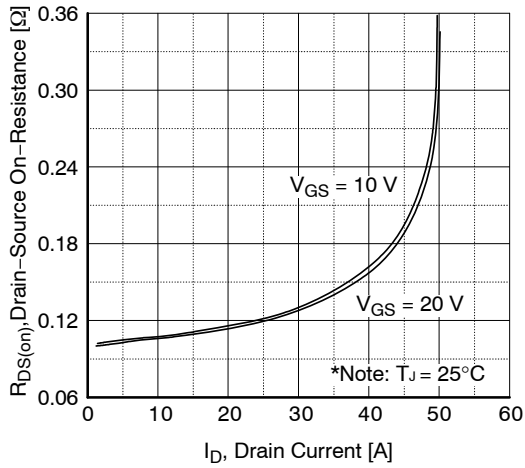


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

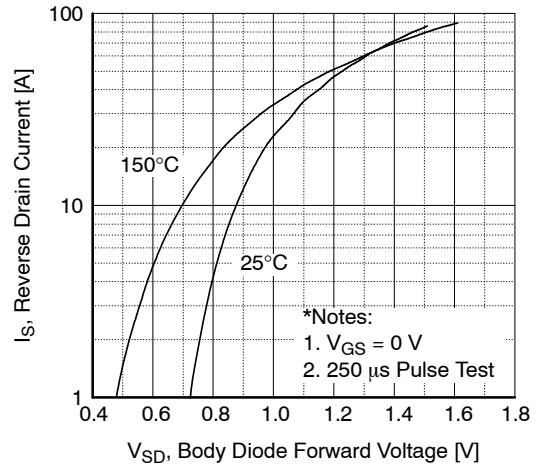


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

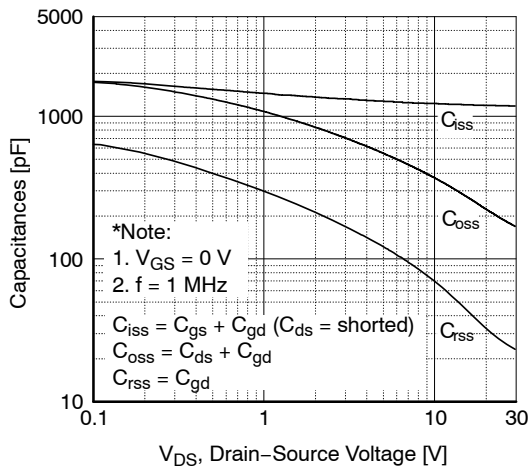


Figure 5. Capacitance Characteristics

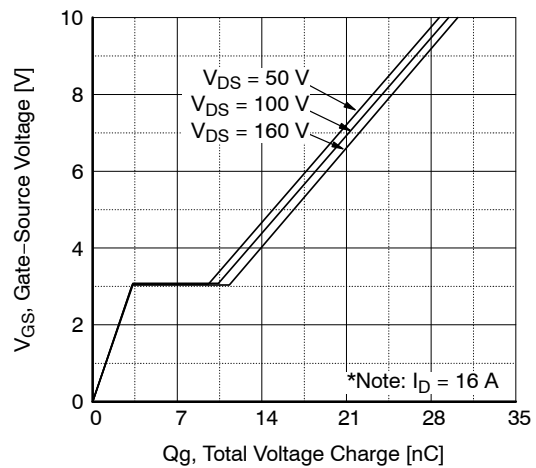
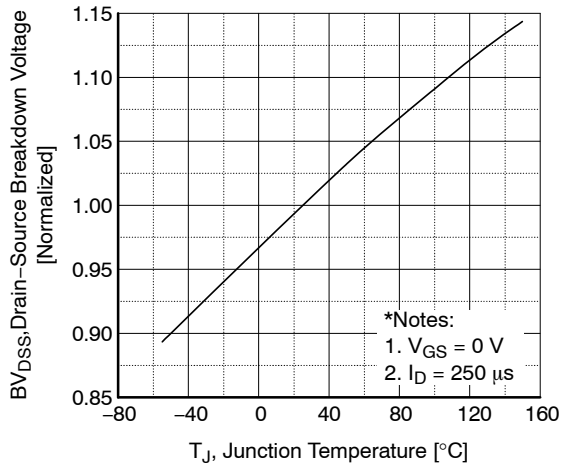


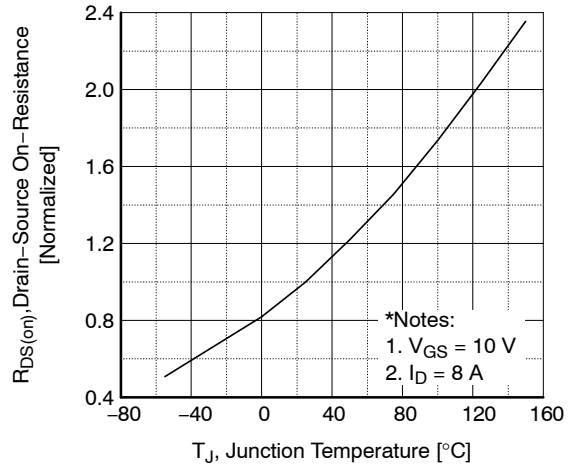
Figure 6. Gate Charge Characteristics

# FDD18N20LZ

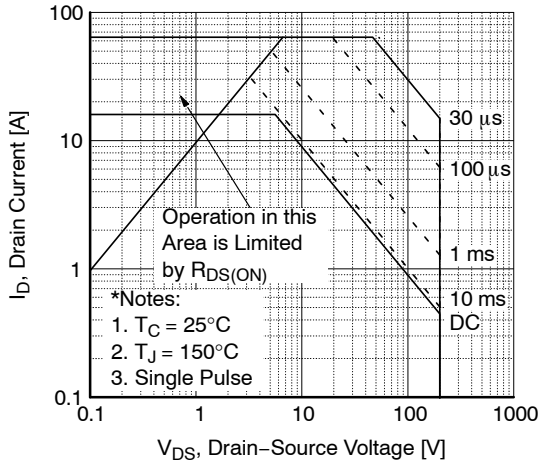
## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



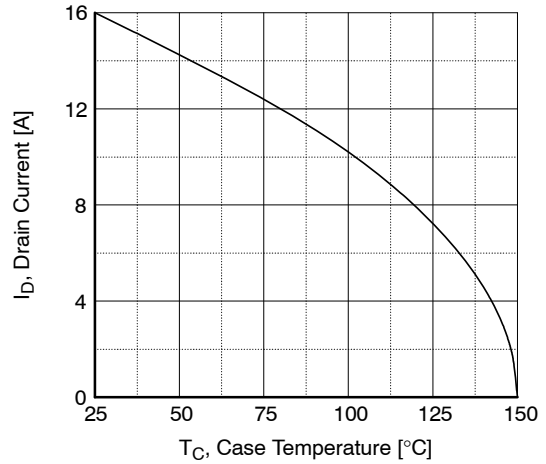
**Figure 7. Breakdown Voltage Variation vs. Temperature**



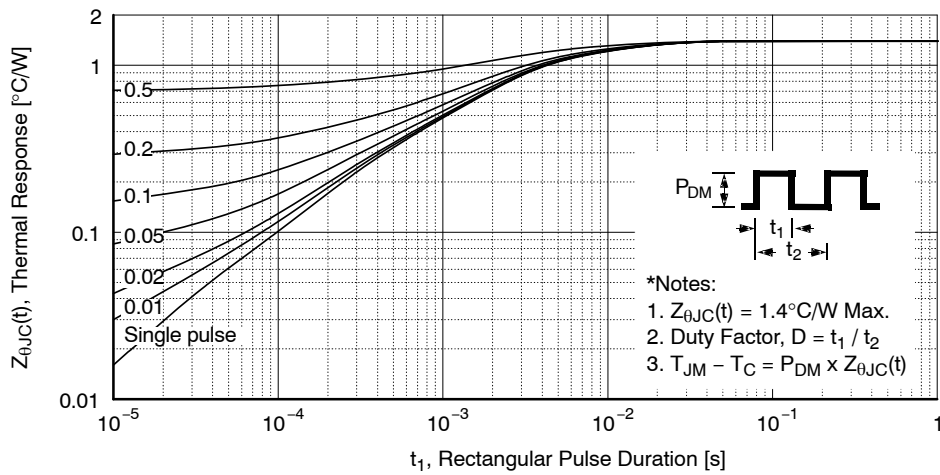
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

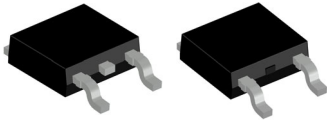
# FDD18N20LZ

## PACKAGE MARKING AND ORDERING INFORMATION

| Part Number | Top Mark   | Package                          | Reel Size | Tape Width | Shipping <sup>†</sup> |
|-------------|------------|----------------------------------|-----------|------------|-----------------------|
| FDD18N20LZ  | FDD18N20LZ | DPAK3 (TO-252 3 LD)<br>(Pb-Free) | 330 mm    | 16 mm      | 2500 / Tape & Reel    |

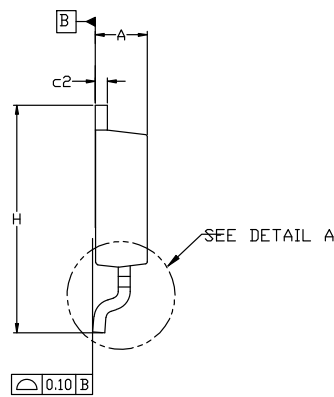
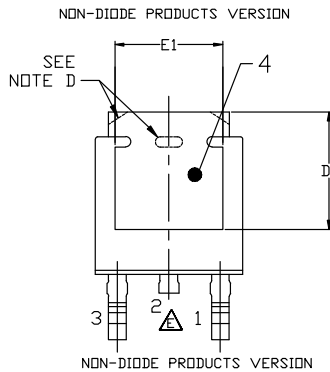
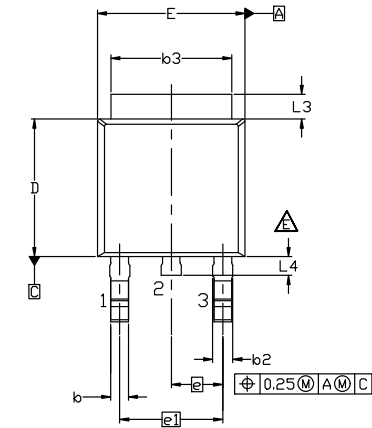
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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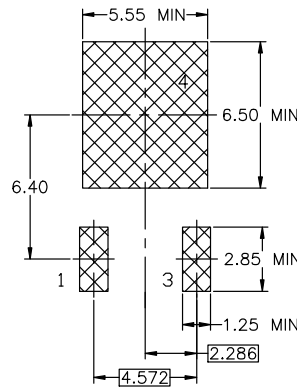
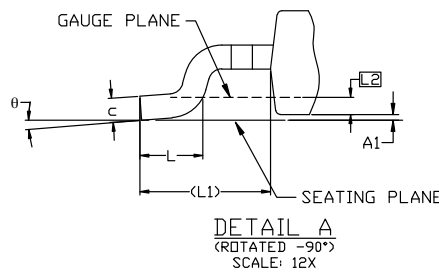


**DPAK3 6.10x6.54x2.29, 4.57P  
CASE 369AS  
ISSUE B**

DATE 20 DEC 2023



- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.  
 D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.  
 E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.  
 F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.  
 G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TD228P991X239-3N.

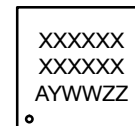


**LAND PATTERN RECOMMENDATION**

\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

| DIM | MILLIMETERS |      |       |
|-----|-------------|------|-------|
|     | MIN.        | NOM. | MAX.  |
| A   | 2.18        | 2.29 | 2.39  |
| A1  | 0.00        | -    | 0.127 |
| b   | 0.64        | 0.77 | 0.89  |
| b2  | 0.76        | 0.95 | 1.14  |
| b3  | 5.21        | 5.34 | 5.46  |
| c   | 0.45        | 0.53 | 0.61  |
| c2  | 0.45        | 0.52 | 0.58  |
| D   | 5.97        | 6.10 | 6.22  |
| D1  | 5.21        | ---  | ---   |
| E   | 6.35        | 6.54 | 6.73  |
| E1  | 4.32        | ---  | ---   |
| e   | 2.286 BSC   |      |       |
| e1  | 4.572 BSC   |      |       |
| H   | 9.40        | 9.91 | 10.41 |
| L   | 1.40        | 1.59 | 1.78  |
| L1  | 2.90 REF    |      |       |
| L2  | 0.51 BSC    |      |       |
| L3  | 0.89        | 1.08 | 1.27  |
| L4  | ---         | ---  | 1.02  |
| θ   | 0°          | ---  | 10°   |

**GENERIC MARKING DIAGRAM\***



\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

|                         |                                    |  |
|-------------------------|------------------------------------|--|
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| <b>DESCRIPTION:</b>     | <b>DPAK3 6.10x6.54x2.29, 4.57P</b> | <b>PAGE 1 OF 1</b>   |

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