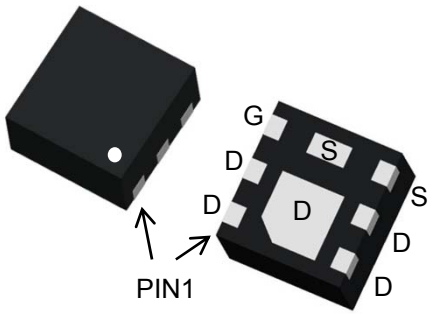
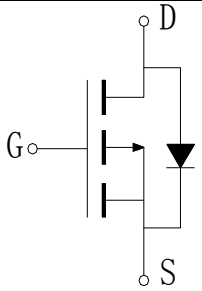
## Features

- -16V/-4A,
  $R_{DS\ (ON)}$ =70mΩ(Typ.)@$V_{GS}$=-4.5V
  $R_{DS\ (ON)}$ =100mΩ(Typ.)@$V_{GS}$=-2.5V
- Super High Dense Cell Design
- Fast Switching Speed
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

## Pin Description




SDFN2020




P-Channel MOSFET

## Applications

- Load Switch
- Battery Charge
- DC/DC Converters

## Absolute Maximum Ratings

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| **Common Ratings** ($T_C$=25°C Unless Otherwise Noted) | | | | |
| $V_{DSS}$ | Drain-Source Voltage | | -16 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±12 | |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | °C |
| $I_S$ | Diode Continuous Forward Current | $T_C$=25°C | -4 | A |
| **Mounted on Large Heat Sink** | | | | |
| $I_{DP}$ ① | 300μs Pulse Drain Current Tested | $T_C$=25°C | -16 | A |
| $I_D$ ② | Continuous Drain Current@$T_C$($V_{GS}$=-4.5V) | $T_C$=25°C | -4 | A |
| | | $T_C$=100°C | -2.5 | |
| | Continuous Drain Current@$T_A$($V_{GS}$=-4.5V) ③ | $T_A$=25°C | 1.8 | |
| | | $T_A$=70°C | 1.4 | |
| $P_D$ | Maximum Power Dissipation@$T_C$ | $T_C$=25°C | 15.2 | W |
| | | $T_C$=100°C | 6 | |
| | Maximum Power Dissipation@$T_A$ ③ | $T_A$=25°C | 2.5 | |
| | | $T_A$=70°C | 1.6 | |

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 8.2 | °C/W |
| $R_{\theta JA}$ ③ | Thermal Resistance-Junction to Ambient | 50 | °C/W |
| **Drain-Source Avalanche Ratings** | | | |
| $E_{AS}$ ④ | Avalanche Energy, Single Pulsed | TBD | mJ |

## Electrical Characteristics ($T_C$=25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Condition | RU16P4M4 | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=-250μA | -16 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-16V, $V_{GS}$=0V | | | -1 | μA |
| | | $T_J$=125°C | | | -30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=-250μA | -0.5 | | -1 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0V | | | ±100 | nA |
| $R_{DS(ON)}$ ⑤ | Drain-Source On-state Resistance | $V_{GS}$=-4.5V, $I_{DS}$=-4A | | 70 | 80 | mΩ |
| | | $V_{GS}$=-2.5V, $I_{DS}$=-2A | | 100 | 110 | mΩ |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ ⑤ | Diode Forward Voltage | $I_{SD}$=-1A, $V_{GS}$=0V | | | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$=-4A, $dI_{SD}/dt$=100A/μs | | 7 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 3 | | nC |
| **Dynamic Characteristics** ⑥ | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V,$V_{DS}$=0V,F=1MHz | | 0.8 | | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=-8V, Frequency=1.0MHz | | 480 | | pF |
| $C_{oss}$ | Output Capacitance | | | 78 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 42 | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=-8V,$I_{DS}$=-4A, $V_{GEN}$=-4.5V,$R_G$=6Ω | | 6 | | ns |
| $t_r$ | Turn-on Rise Time | | | 10 | | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | | 19 | | |
| $t_f$ | Turn-off Fall Time | | | 8 | | |
| **Gate Charge Characteristics** ⑥ | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-12V, $V_{GS}$=-4.5V, $I_{DS}$=-4A | | 7 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 1.1 | | |
| $Q_{gd}$ | Gate-Drain Charge | | | 2.3 | | |

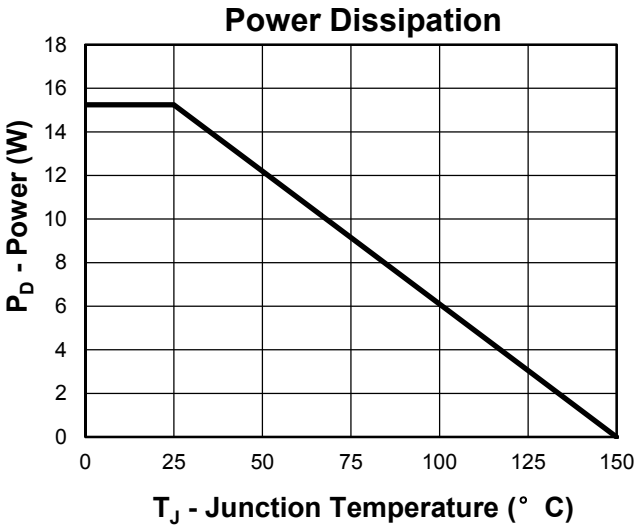
Notes:

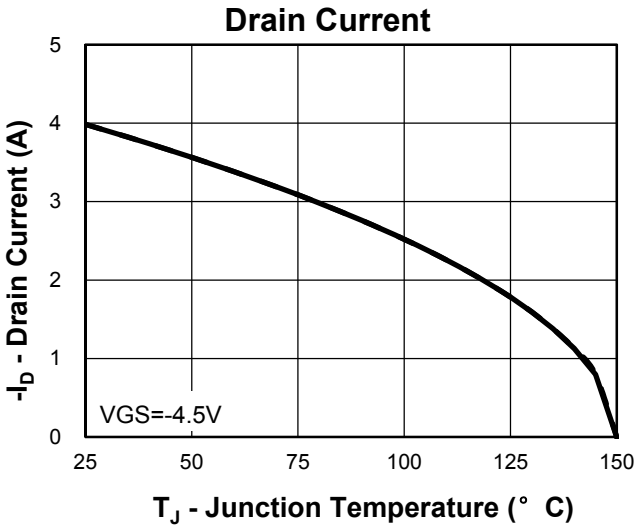
①Pulse width limited by safe operating area.
②Calculated continuous current based on maximum allowable junction temperature.
③When mounted on 1 inch square copper board, t≤10sec.
④Limited by $T_{Jmax}$, Starting $T_J$ = 25°C.
⑤Pulse test;Pulse width≤300μs, duty cycle≤2%.
⑥Guaranteed by design, not subject to production testing.

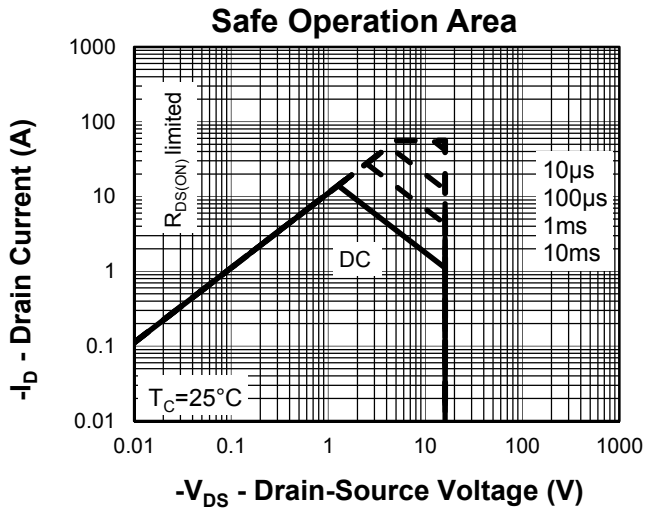
## Ordering and Marking Information

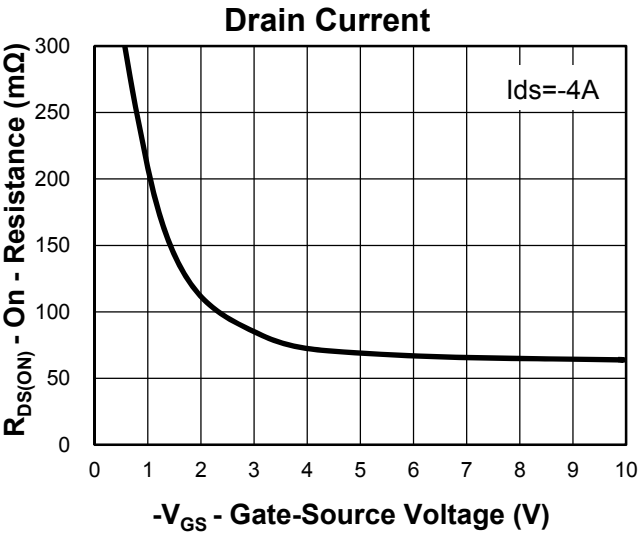
| Device | Marking | Package | Packaging | Quantity | Reel Size | Tape width |
|---|---|---|---|---|---|---|
| RU16P4M4 | 16P4 | SDFN2020 | Tape&Reel | 3000 | 7" | 8mm |

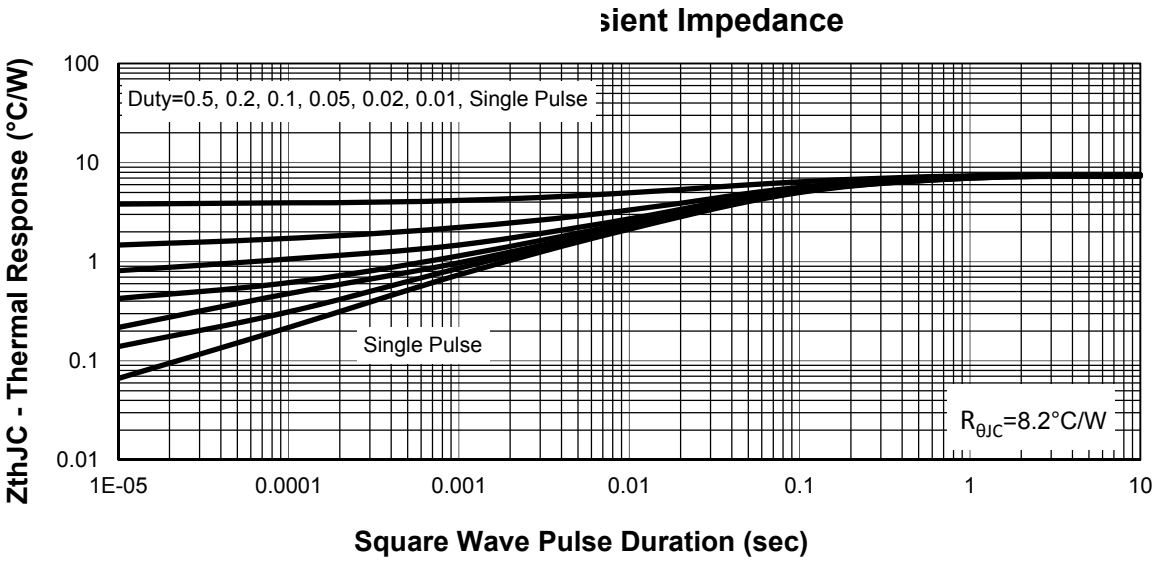
## Typical Characteristics



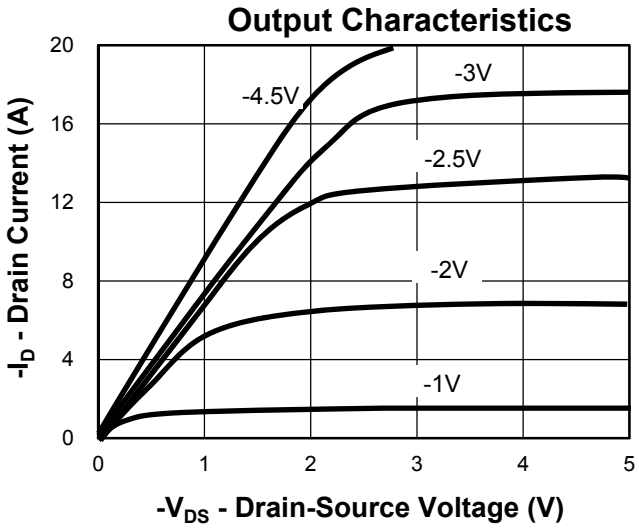



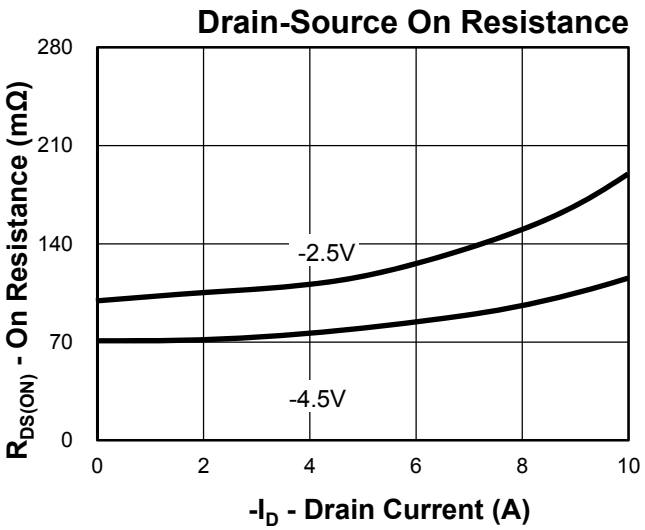



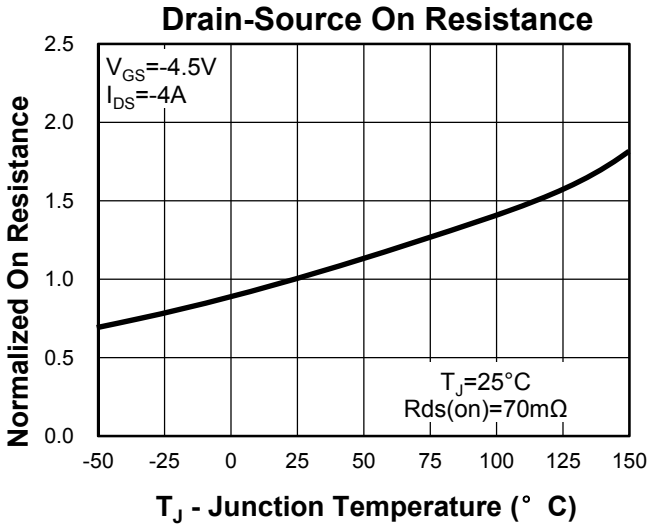



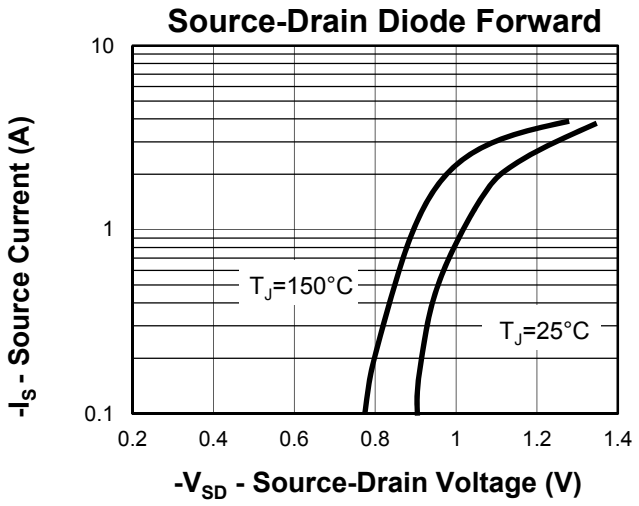



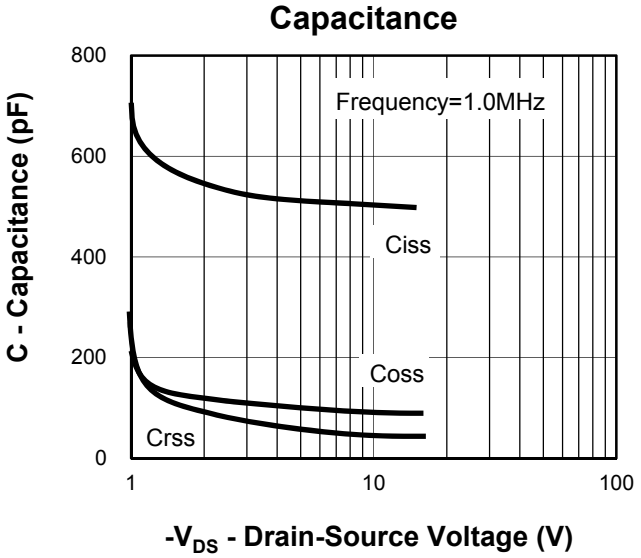
## Typical Characteristics

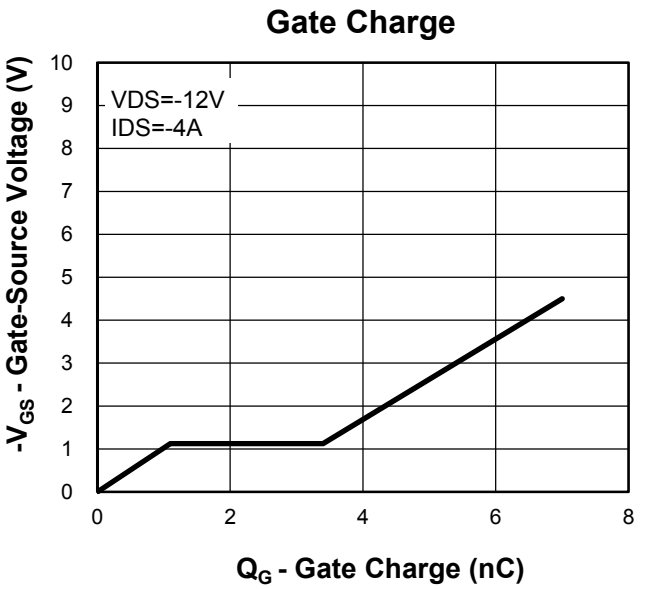


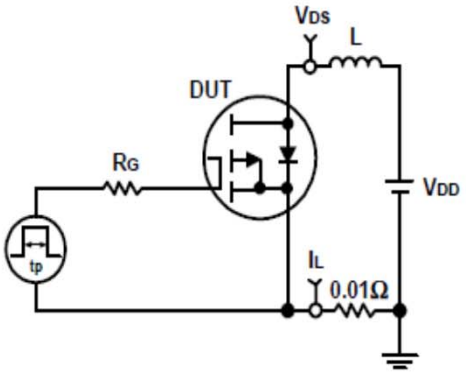



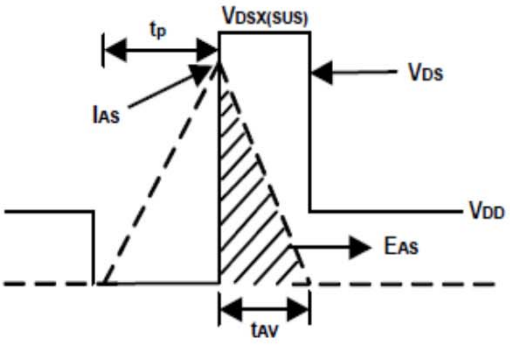



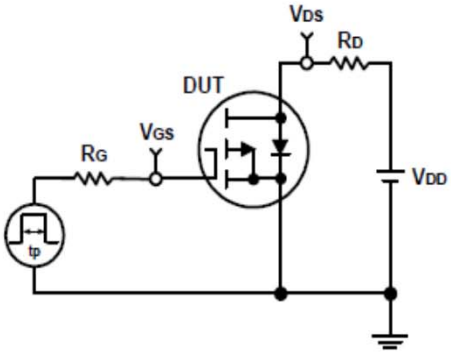



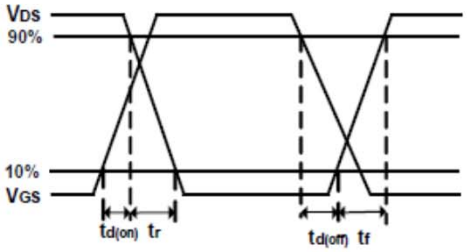
## Avalanche Test Circuit and Waveforms



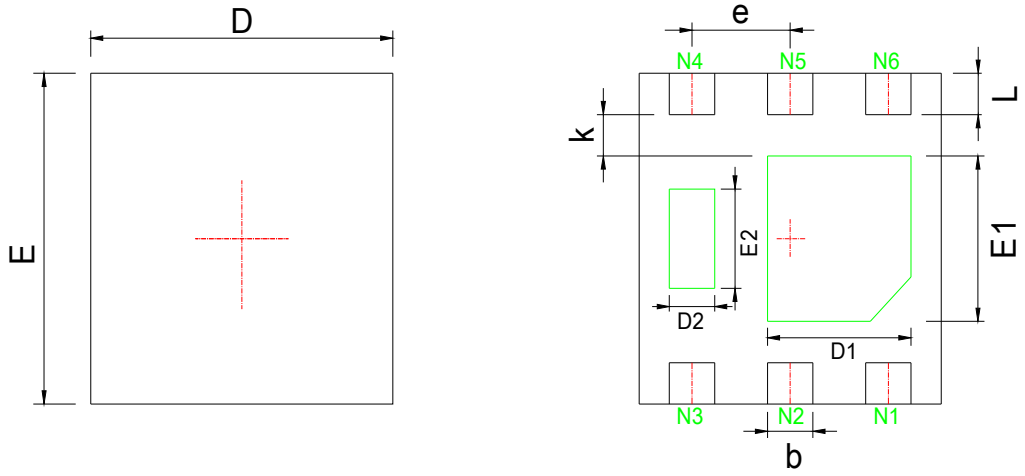

## Switching Time Test Circuit and Waveforms



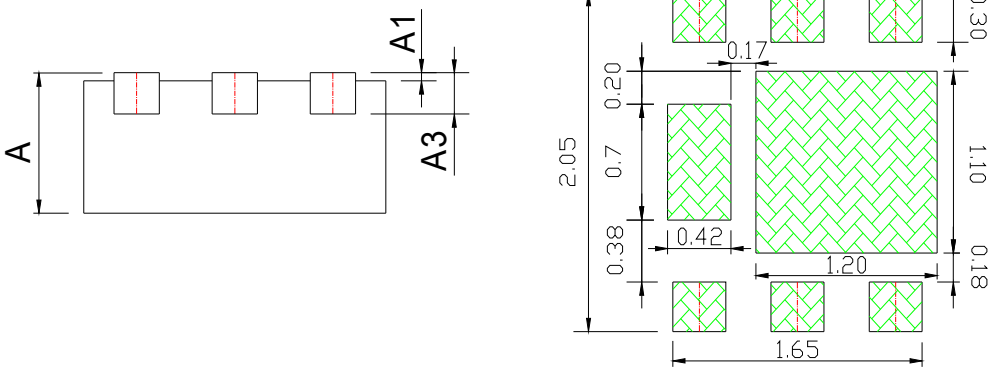



## Package Information

SDFN2020




Land Pattern
(Only for Reference)




| SYMBOL | MM | | | INCH | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.500 | 0.550 | 0.600 | 0.020 | 0.022 | 0.024 |
| A1 | 0.000 | 0.025 | 0.050 | 0.000 | 0.001 | 0.002 |
| A3 | 0.203 REF. | | | 0.008 REF. | | |
| D | 1.924 | 2.000 | 2.076 | 0.076 | 0.079 | 0.082 |
| E | 1.924 | 2.000 | 2.076 | 0.076 | 0.079 | 0.082 |
| D1 | 0.800 | 0.900 | 1.000 | 0.031 | 0.035 | 0.039 |
| E1 | 0.850 | 0.950 | 1.050 | 0.033 | 0.037 | 0.041 |
| D2 | 0.200 | 0.300 | 0.400 | 0.008 | 0.012 | 0.016 |
| E2 | 0.460 | 0.560 | 0.660 | 0.018 | 0.022 | 0.026 |
| K | 0.200 MIN. | | | 0.008 MIN. | | |
| b | 0.250 | 0.300 | 0.350 | 0.010 | 0.012 | 0.014 |
| e | 0.650 TYP | | | 0.026 TYP | | |
| L | 0.174 | 0.250 | 0.326 | 0.007 | 0.010 | 0.013 |

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