

Features

- Dual 30V N-Channel MOSFETs (Q1, Q2) with Dual 3.0A Super Barrier Rectifier Diodes (D1, D2) packaged in a 4.0 x 4.0 x 0.6mm DFN package
- Full-Bridge Rectifier Block
- Super Barrier Rectifiers (D1, D2)
 - Ultra low forward voltage drop
 - Patented Super Barrier Rectifier technology
 - +150°C operating temperature
 - ±8kV ESD protection (HBM, 3B)
 - ±25kV ESD protection (IEC61000-4-2 Level 4, Air Discharge)
- N-Channel MOSFET (Q1, Q2)
 - Low On-Resistance to minimize conduction loss
 - Low Gate Threshold Voltage
 - Low Input Capacitance
 - Fast Switching Speed
 - Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

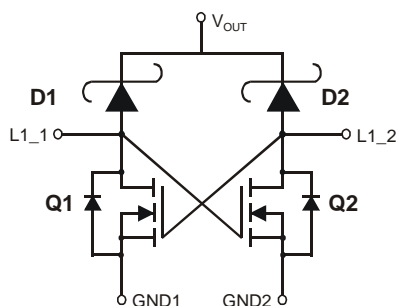
Mechanical Data

- Case: U-DFN4040-8
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: NiPdAu over Copper Leadframe (Lead-Free Plating); Solderable per MIL-STD-202, Method 208④
- Terminal Connections: See Diagram
- Weight: 0.031 grams

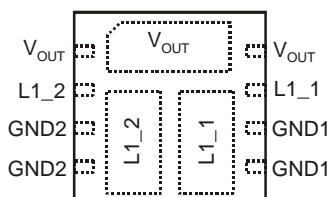
Applications

- Wireless Charging
- AC-DC Rectification
- Optimized for Power Management Applications for Portable Products

U-DFN4040-8



Device Schematic (Dual Channel)


 Top View
Pin Configuration

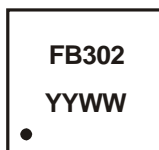
Ordering Information (Note 4)

| Part Number | Compliance | Case | Packaging |
|----------------|------------|-------------|-------------------|
| DFBR030U3LP-13 | Standard | U-DFN4040-8 | 4,000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information

U-DFN4040-8



FB302 = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Digit of Year (ex: 15 for 2015)
 WW = Week Code (01 to 53)

Maximum Ratings – D1, D2 (@T_A = +25°C, unless otherwise specified.)

Single phase, half wave, 60Hz, resistive or inductive load.
For capacitance load, derate current by 20%.

| Characteristic | Symbol | Value | Unit |
|--|---------------------|-------|------|
| Peak Repetitive Reverse Voltage | V _{RRM} | 30 | V |
| Working Peak Reverse Voltage | V _{RWM} | | |
| DC Blocking Voltage | V _{RM} | | |
| RMS Reverse Voltage | V _{R(RMS)} | 21 | V |
| Average Rectified Output Current (See Figure 1) | I _O | 3.0 | A |
| Non-Repetitive Peak Forward Surge Current 8.3ms Single Half Sine-Wave Superimposed on Rated Load | I _{FSM} | 20 | A |

Maximum Ratings – Q1, Q2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Units |
|--|------------------|-------|-------|
| Input Voltage Between Two MOSFET Drain | V _{LL} | 30 | V |
| Drain-Source Voltage | V _{DSS} | 30 | V |
| Gate-Source Voltage | V _{GSS} | ±20 | V |
| Drain Current (Note 5) | I _D | 3.2 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 5) | P _D | 500 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 5) | R _{θJA} | 250 | °C/W |
| Power Dissipation (Note 6) | P _D | 1000 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 6) | R _{θJA} | 125 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics – D1, D2 (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|------------------------------------|--------------------|-----|------|-------|------|--|
| Reverse Breakdown Voltage (Note 7) | V _{(BR)R} | 30 | — | — | V | I _R = 400μA |
| Forward Voltage Drop | V _F | — | 0.25 | 0.278 | V | I _F = 0.1A, T _J = +25°C |
| | | — | 0.33 | 0.37 | | I _F = 1.0A, T _J = +25°C |
| | | — | 0.36 | 0.42 | | I _F = 2.0A, T _J = +25°C |
| | | — | 0.24 | 0.27 | | I _F = 0.1A, T _J = +125°C |
| | | — | 0.33 | 0.36 | | I _F = 1.0A, T _J = +125°C |
| | | — | 0.35 | 0.40 | | I _F = 2.0A, T _J = +125°C |
| Leakage Current (Note 7) | I _R | — | 50 | 150 | μA | V _R = 5V, T _J = +25°C |
| | | — | 100 | 400 | μA | V _R = 30V, T _J = +25°C |
| | | — | 6 | 15 | mA | V _R = 5V, T _J = +125°C |
| | | — | 10 | 20 | mA | V _R = 30V, T _J = +125°C |

Notes: 5. Part mounted on FR-4 board with recommended pad layout, which can be found on our website at <http://www.diodes.com>.
6. Part mounted on FR-4 board with 1-in sq pad layout, 2oz Cu.
7. Short duration pulse test used to minimize self-heating effect. Pulse width ≤ 300μs, duty cycle ≤ 2%.

Electrical Characteristics – Q1, Q2 (@T_A = +25°C, unless otherwise specified.)

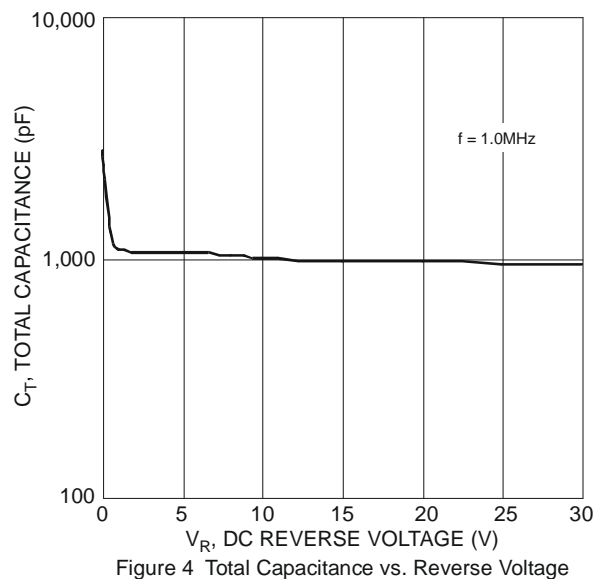
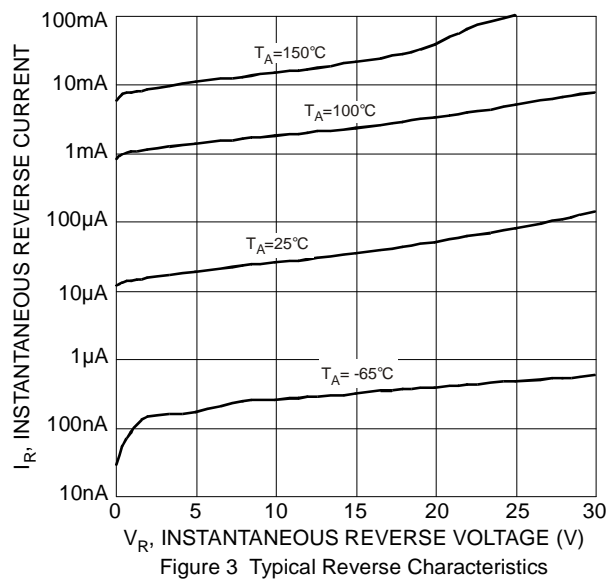
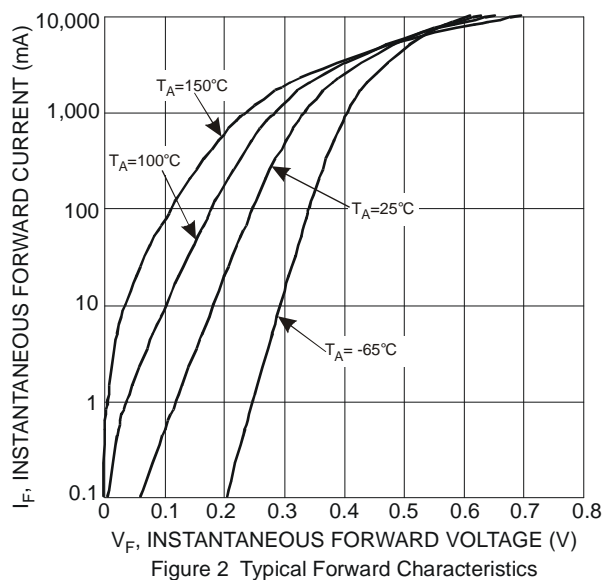
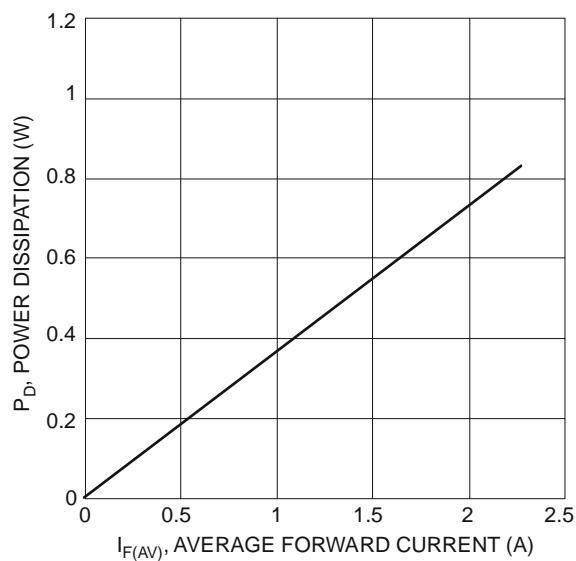
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|---------------------|-----|-----|------|------|--|
| OFF CHARACTERISTICS (Note 7) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 30 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 220 | μA | V _{DS} = 30V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±200 | μA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 7) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 1 | — | 2.2 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 13 | -- | mΩ | V _{GS} = 10V, I _D = 2.0A |
| | | | 17 | 26 | | V _{GS} = 10V, I _D = 3.2A |
| | | | 22 | -- | | V _{GS} = 4.5V, I _D = 2.0A |
| | | | 23 | 32 | | V _{GS} = 4.5V, I _D = 3.2A |
| Forward Transconductance | g _{fs} | — | 7 | — | S | V _{DS} = 15V, I _D = 2.0A |
| Diode Forward Voltage (Note 7) | V _{SD} | 0.5 | — | 1.2 | V | V _{GS} = 0V, I _S = 2.25A |

Electrical Characteristics – DFBR030U3LP (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|--------------------|-----|------|------|------|---|
| Rectifying Forward Voltage (Note 7) | V _{fd2} | — | 0.45 | 0.56 | V | Input voltage V _{LL} = ±5V; The output current of Rectifier I _{OUT} = 2A |
| Rectifier leakage current | I _{leak} | — | 30 | 1000 | μA | Input voltage V _{LL} = 16V; No Load on the Rectifier output |
| Rectifier Reverse leakage current | I _{rleak} | — | 20 | 1000 | μA | Input voltage V _{LL} = 0V; The output voltage of the Rectifier V _{OUT} = 5V |

Note: 7. Short duration pulse test used to minimize self-heating effect. Pulse width ≤ 300μs, duty cycle ≤ 2%.

Typical Performance Curves – D1, D2



Typical Performance Curves – Q1, Q2

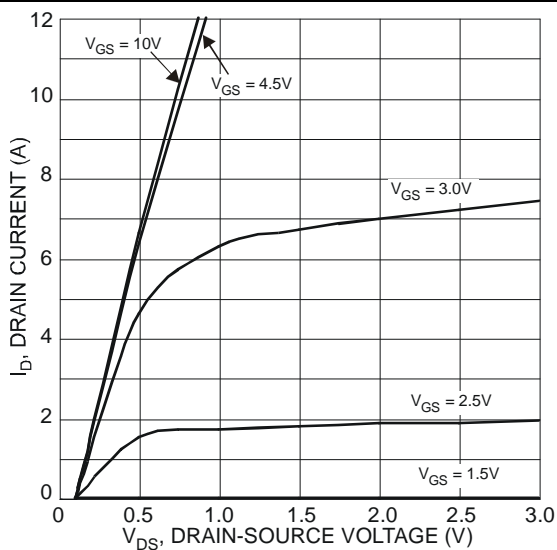


Figure 5 Typical Output Characteristics

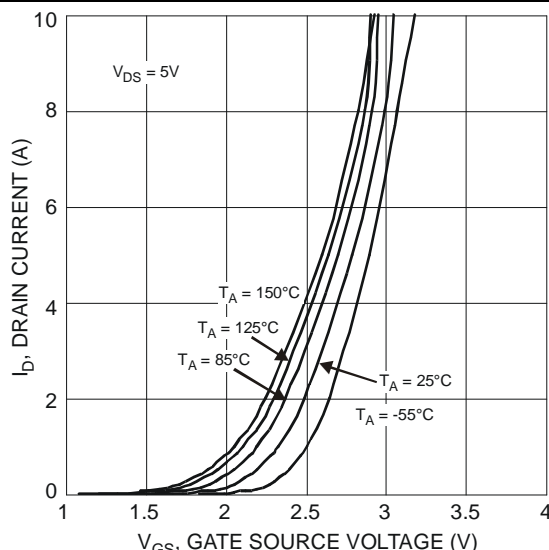


Figure 6 Typical Transfer Characteristics

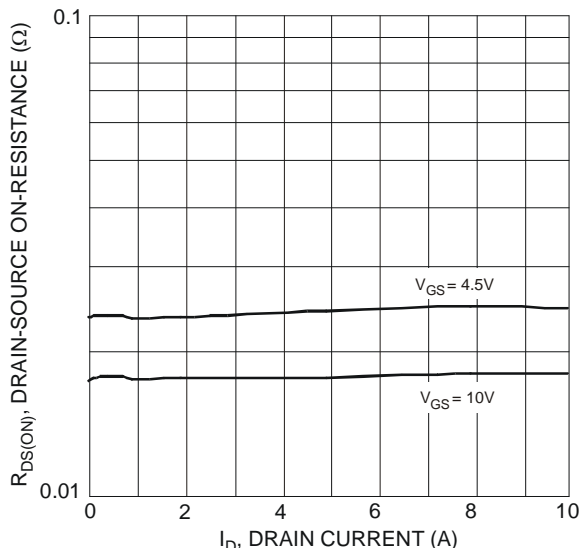


Figure 7 Typical On-Resistance vs. Drain Current and Gate Voltage

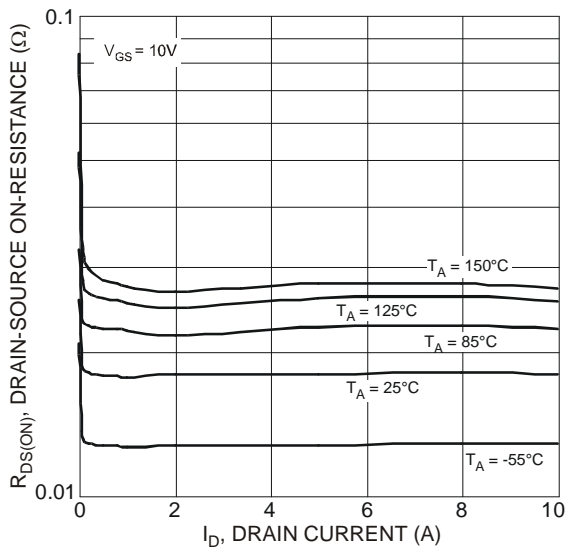


Figure 8 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

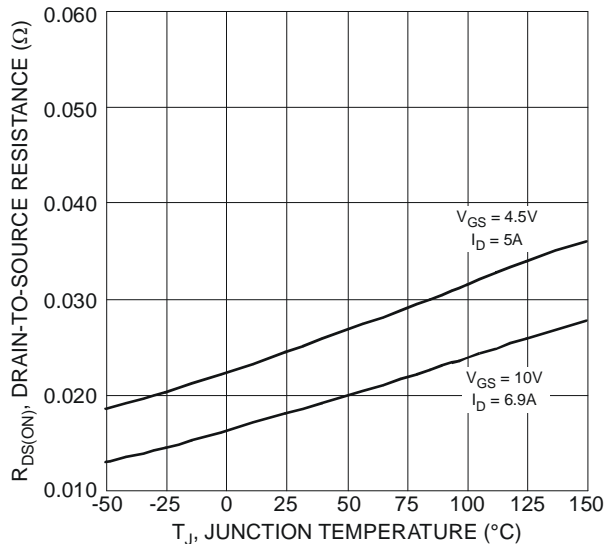


Figure 9 On-Resistance Variation with Temperature

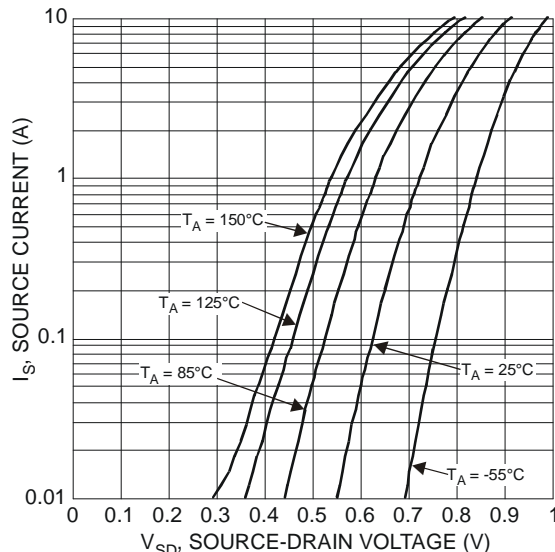


Figure 10 Diode Forward Voltage vs. Current

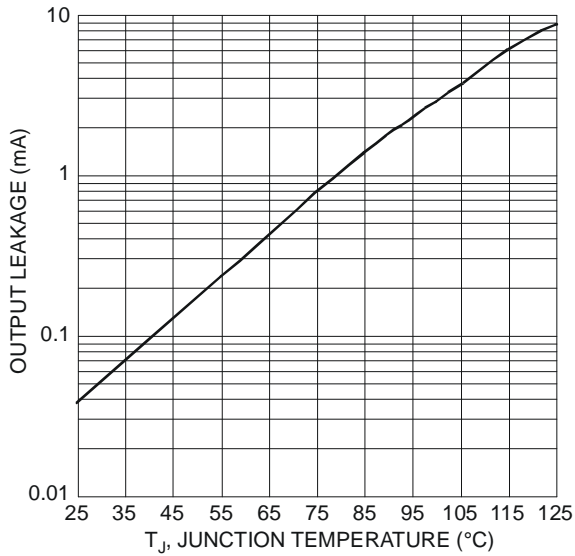


Figure 11 Output Leakage at 5V Bias vs. Junction Temperature

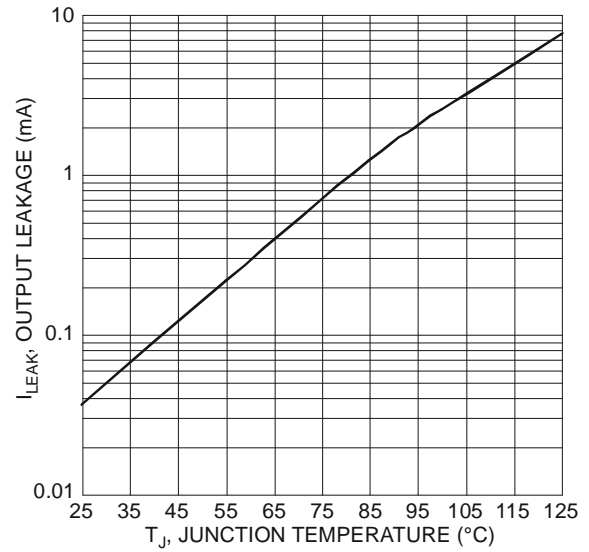


Figure 12 Input Leakage at 16V Bias vs. Junction Temperature

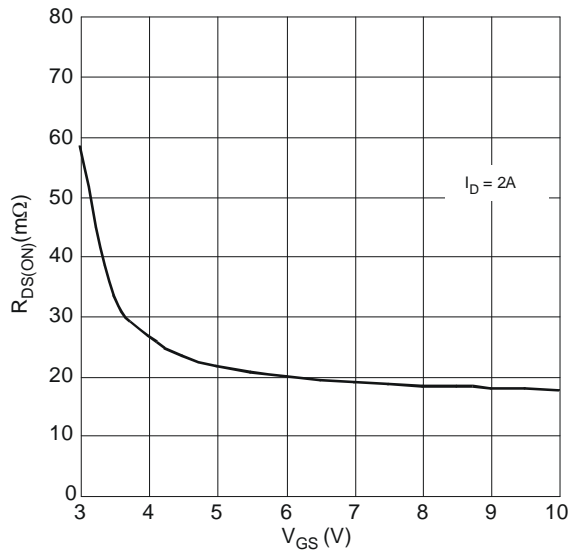


Figure 13 FET Typical On-Resistance vs. Gate-to-Source Voltage (from 3V to 10V)

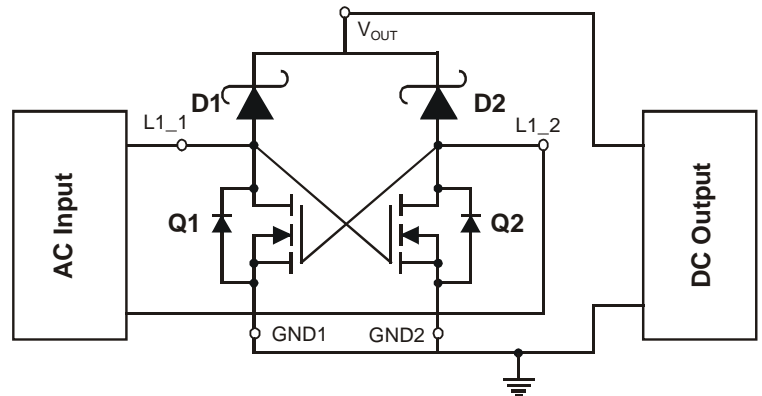
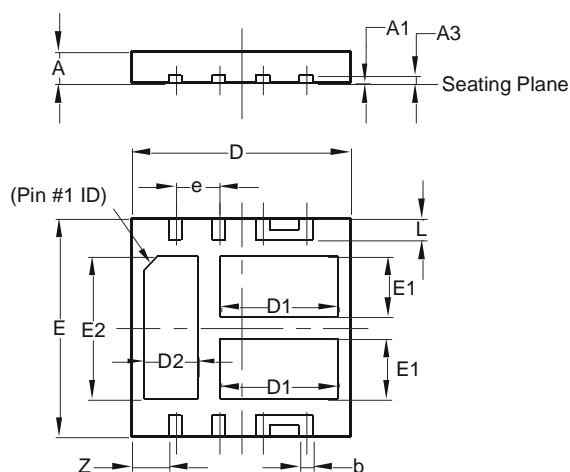


Figure 14 Typical Application Circuit
GND1 and GND2 are not internally connected.
The user should make the connection in the PCB design.

Package Outline Dimensions

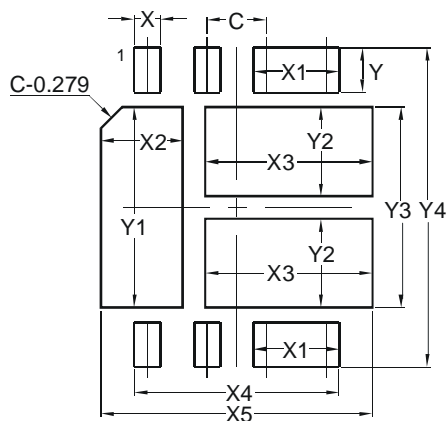
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| U-DFN4040-8 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.57 | 0.63 | 0.60 |
| A1 | 0 | 0.05 | 0.02 |
| A3 | - | - | 0.15 |
| b | 0.20 | 0.30 | 0.25 |
| D | 3.95 | 4.05 | 4.00 |
| D1 | 2.05 | 2.25 | 2.15 |
| D2 | 0.90 | 1.10 | 1.00 |
| E | 3.95 | 4.05 | 4.00 |
| E1 | 1.00 | 1.20 | 1.10 |
| E2 | 2.50 | 2.70 | 2.60 |
| e | - | - | 0.80 |
| L | 0.35 | 0.45 | 0.40 |
| Z | - | - | 0.675 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.800 |
| X | 0.350 |
| X1 | 1.150 |
| X2 | 1.100 |
| X3 | 2.250 |
| X4 | 2.750 |
| X5 | 3.650 |
| Y | 0.600 |
| Y1 | 2.700 |
| Y2 | 1.200 |
| Y3 | 2.700 |
| Y4 | 4.300 |

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