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# MIC5365/6

## High-Performance Single 150 mA LDO

### Features

- 2.5V to 5.5V Input Voltage Range
- 150 mA Guaranteed Output Current
- Stable with 1 µF Ceramic Output Capacitors
- Low Dropout Voltage (155 mV at 150 mA)
- Excellent Load/Line Transient Response
- Low Quiescent Current: 29 µA
- High PSRR: 70 dB
- Output Discharge Circuit: MIC5366
- High Output Accuracy
  - ±2% Initial Accuracy
- Thermal Shutdown and Current Limit Protection
- Tiny 1 mm × 1 mm UDFN, SC-70-5, and Thin SOT23-5 Packages

### Applications

- Mobile Phones
- Digital Cameras
- GPS, PMP, PDAs, and Handhelds
- Portable Electronics

### General Description

The MIC5365/6 are advanced general purpose linear regulators offering high power supply rejection (PSRR) in an ultra-small 1 mm × 1 mm package. The MIC5366 includes an auto-discharge feature that is activated when the enable pin is low. The MIC5365/6 is capable of sourcing 150 mA output current and offers high PSRR making it an ideal solution for any portable electronic application.

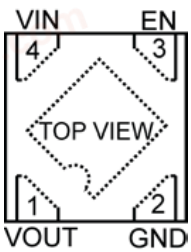
Ideal for battery-powered applications, the MIC5365/6 offers 2% initial accuracy, low dropout voltage (155 mV @ 150 mA), and low ground current (typically 29 µA). The MIC5365/6 can also be put into a zero-off-mode current state, drawing virtually no current when disabled.

The MIC5365/6 is available in several advanced packages including a lead-free (RoHS-compliant) 1 mm × 1 mm UDFN occupying only 1 $mm^2$ of PCB area, a 75% reduction in board area compared to SC-70 and 2 mm × 2 mm UDFN packages. It is also available in a thin SOT23-5 package.

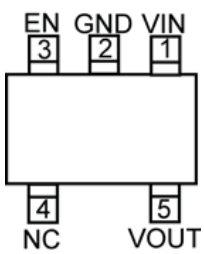
The MIC5365/6 have an operating junction temperature range of -40°C to 125°C.

### Package Types

**MIC5365/6**
4-Lead UDFN (MT)




**MIC5365/6**
5-Lead TSOT23-5 (D5)
5-Lead SC-70 (C5)

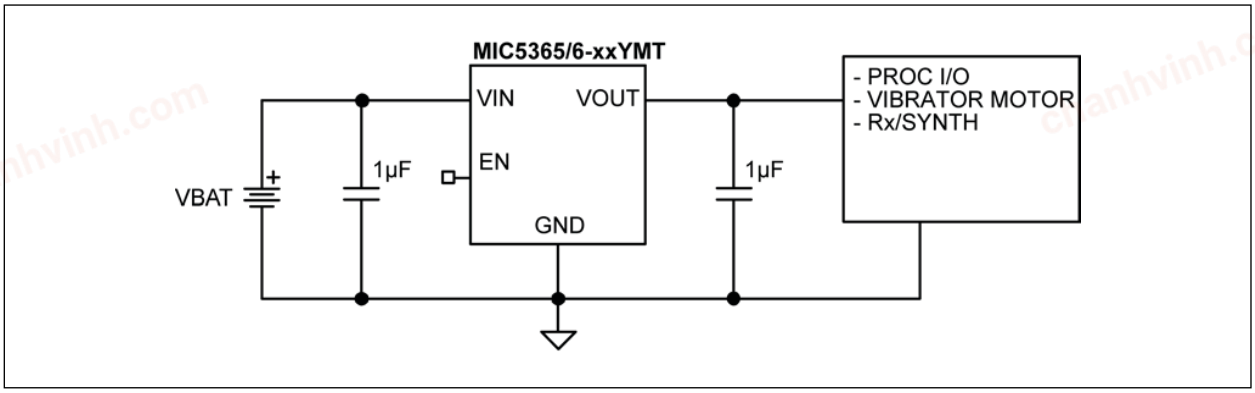



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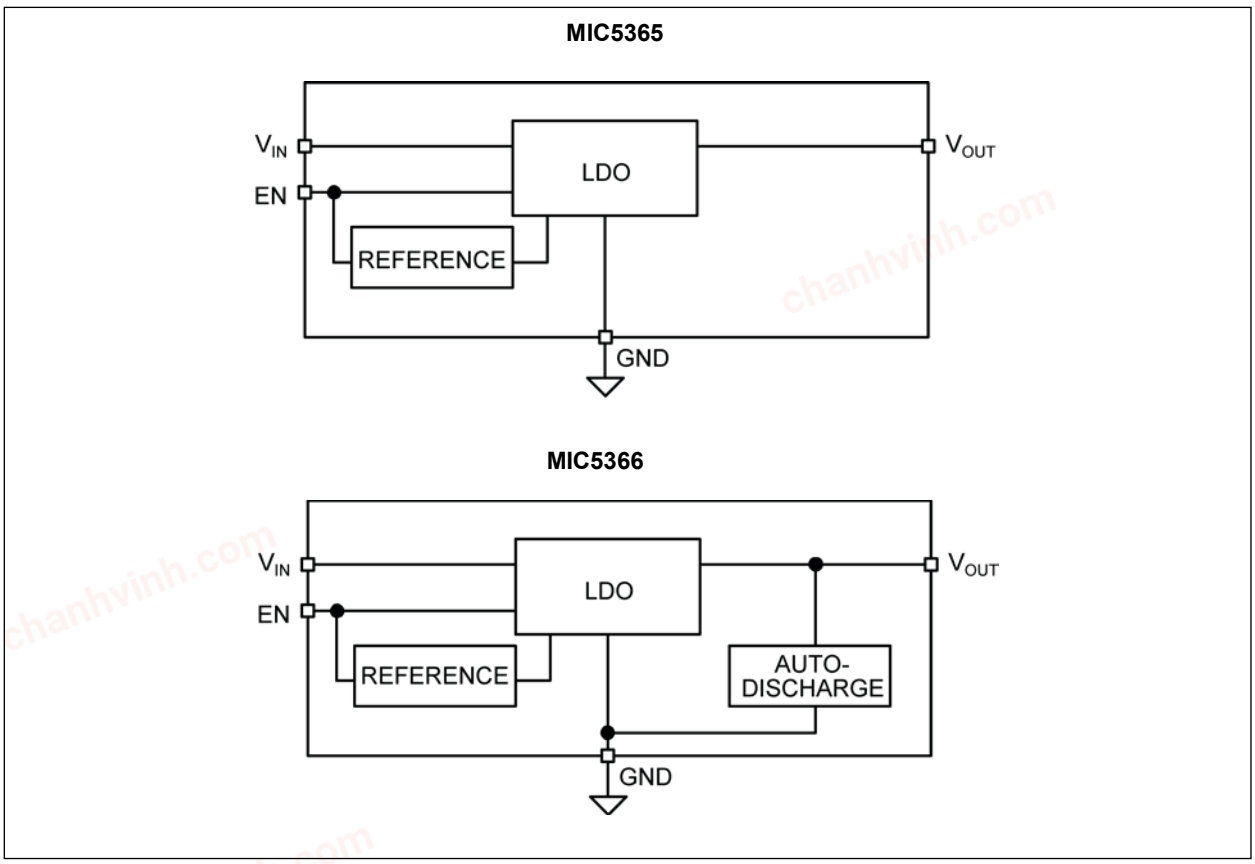
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## Typical Application Circuit




## Functional Block Diagrams





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## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings †

Supply Voltage ($V_{IN}$) ..... 0V to +6V
Enable Voltage ($V_{EN}$) ..... 0V to $V_{IN}$
Power Dissipation ($P_D$), Note 1 ..... Internally Limited
ESD Rating, Note 2 ..... 2 kV

### Operating Ratings ‡

Supply Voltage ($V_{IN}$) ..... +2.5V to +5.5V
Enable Voltage ($V_{EN}$) ..... 0V to $V_{IN}$

**† Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

**‡ Notice:** The device is not guaranteed to function outside its operating ratings.

**Note 1:** The maximum allowable power dissipation of any $T_A$ (ambient temperature) is $P_{D(MAX)} = (T_{J(MAX)} - T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

**2:** Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

## ELECTRICAL CHARACTERISTICS

**Electrical Characteristics:** $V_{IN} = V_{EN} = V_{OUT} + 1V$; $C_{IN} = C_{OUT} = 1\ \mu F$; $I_{OUT} = 100\ \mu A$; $T_A = +25°C$; **Bold** values are valid for -40°C to +125°C unless noted. **(Note 1)**.

| Parameters | Symbol | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| Output Voltage Accuracy | $V_{OUT}$ | -2.0 | — | +2.0 | % | Variation from nominal $V_{OUT}$ |
| | | **-3.0** | — | **+3.0** | | Variation from nominal $V_{OUT}$; -40°C to +125°C |
| Line Regulation | $\Delta V_{OUT}/V_{OUT}$ | — | 0.02 | **0.3** | % | $V_{IN} = V_{OUT}$ +1V to 5.5V; $I_{OUT} = 100\ \mu A$ |
| Load Regulation | $\Delta V_{OUT}/V_{OUT}$ | — | 0.3 | 1 | % | $I_{OUT} = 100\ \mu A$ to 150 mA |
| Dropout Voltage | $V_{DO}$ | — | 55 | **110** | mV | $I_{OUT} = 50$ mA; $V_{OUT} \geq 2.8V$ |
| | | — | 155 | **310** | | $I_{OUT} = 150$ mA; $V_{OUT} \geq 2.8V$ |
| | | — | 60 | **135** | | $I_{OUT} = 50$ mA; $V_{OUT} < 2.8V$ |
| | | — | 180 | **380** | | $I_{OUT} = 150$ mA; $V_{OUT} < 2.8V$ |
| Ground Pin Current | $I_{GND}$ | — | 29 | **39** | µA | $I_{OUT} = 0$ mA |
| Ground Pin Current in Shutdown | $I_{SHDN}$ | — | 0.05 | 1 | µA | $V_{EN} \leq 0.2V$ |
| Ripple Rejection | PSRR | — | 80 | — | dB | f = up to 1 kHz; $C_{OUT} = 1\ \mu F$ |
| | | — | 65 | — | | f = 1 kHz to 10 kHz, $C_{OUT} = 1$ µf |
| Current Limit | $I_{LIM}$ | 200 | 325 | 550 | mA | $V_{OUT} = 0V$ |
| Output Voltage Noise | $e_N$ | — | 200 | — | $\mu V_{RMS}$ | $C_{OUT} = 1\mu F$, 10 Hz to 100 kHz |
| Auto-Discharge NFET Resistance | $R_{DSCG}$ | — | 30 | — | Ω | MIC5366 Only; $V_{EN} = 0V$; $V_{IN} = 3.6V$, $I_{OUT} = -3$ mA |
| **Enable Inputs** | | | | | | |
| Enable Input Voltage | $V_{IL}$ | — | — | **0.2** | V | Logic Low |
| | $V_{IH}$ | **1.2** | — | — | | Logic High |

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## ELECTRICAL CHARACTERISTICS

**Electrical Characteristics:** $V_{IN} = V_{EN} = V_{OUT} + 1V$; $C_{IN} = C_{OUT} = 1\ \mu F$; $I_{OUT} = 100\ \mu A$; $T_A = +25°C$; **Bold** values are valid for -40°C to +125°C unless noted. **(Note 1)**.

| Parameters | Symbol | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| Enable Input Current | $I_{IL}$ | — | 0.01 | **1** | µA | $V_{IL} \le 0.2V$ |
| | $I_{IH}$ | — | 0.01 | **1** | | $V_{IH} \ge 1.2V$ |
| Turn-On Time | $t_{ON}$ | — | 50 | **125** | µs | $C_{OUT} = 1\ \mu F$; $I_{OUT} = 150$ mA |

**Note 1:** Specification for packaged product only.

## TEMPERATURE SPECIFICATIONS

| Parameters | Symbol | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| **Temperature Ranges** | | | | | | |
| Maximum Junction Temperature Range | $T_{J(MAX)}$ | -40 | — | +150 | °C | Note 1 |
| Storage Temperature Range | $T_S$ | -65 | — | +150 | °C | — |
| Lead Temperature | — | — | — | +260 | °C | Soldering, 3 sec. |
| Junction Temperature | $T_J$ | -40 | — | +125 | °C | — |
| **Package Thermal Resistances** | | | | | | |
| Thermal Resistance, UDFN-4 | $\theta_{JA}$ | — | 240 | — | °C/W | — |
| Thermal Resistance, TSOT23-5 | | — | 253 | — | | |
| Thermal Resistance, SC-70-5 | | — | 256.5 | — | | |

**Note 1:** The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., $T_A$, $T_J$, $\theta_{JA}$). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.


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## 2.0 TYPICAL PERFORMANCE CURVES

**Note:** The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

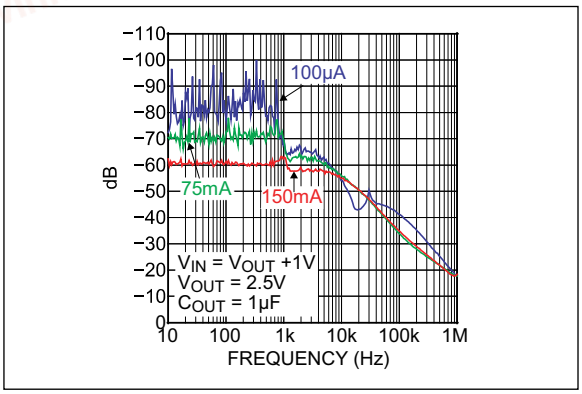



***FIGURE 2-1:*** *Power Supply Rejection Ratio.*

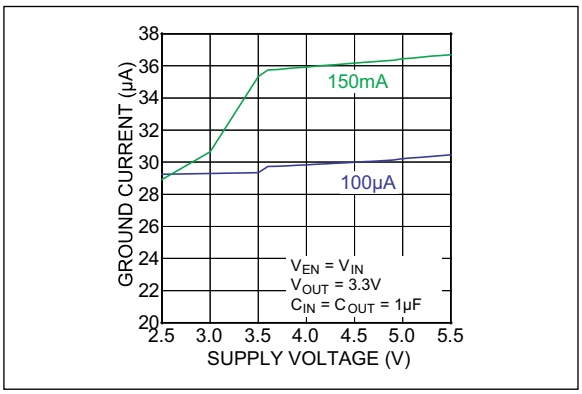



***FIGURE 2-4:*** *Ground Current vs. Supply Voltage.*

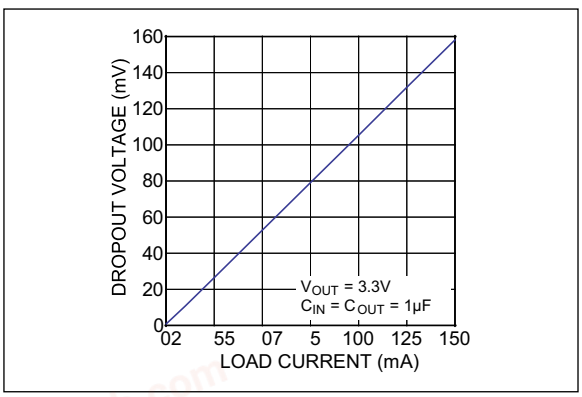



***FIGURE 2-2:*** *Dropout Voltage vs. Load Current.*

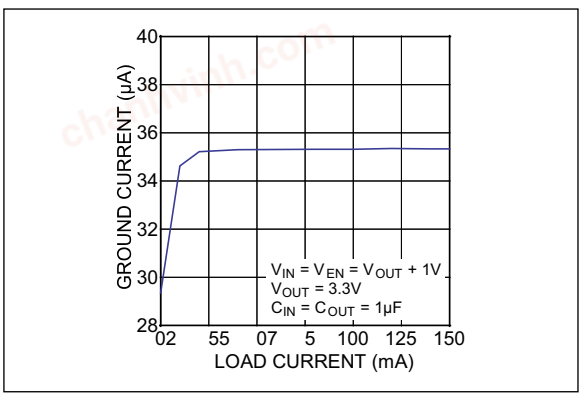



***FIGURE 2-5:*** *Ground Current vs. Load Current.*

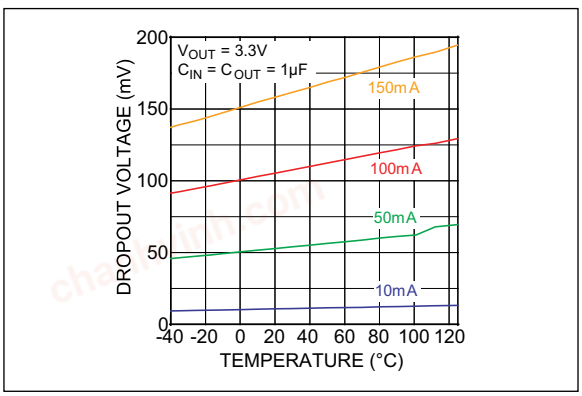



***FIGURE 2-3:*** *Dropout Voltage vs. Temperature.*

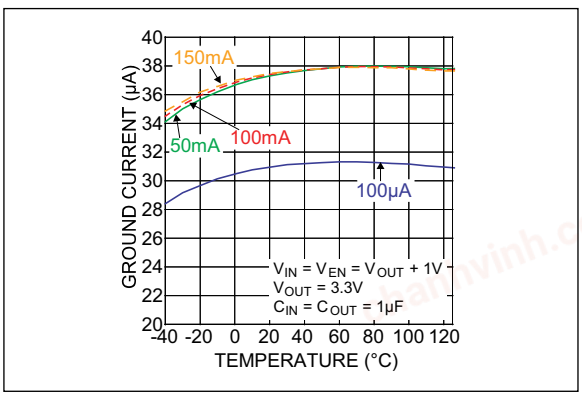



***FIGURE 2-6:*** *Ground Current vs. Temperature.*

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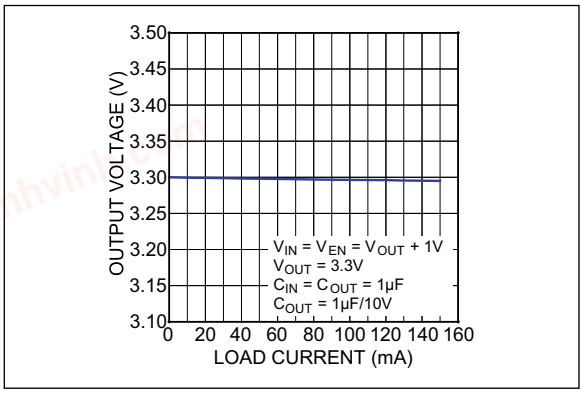



***FIGURE 2-7:*** *Output Voltage vs. Load Current.*

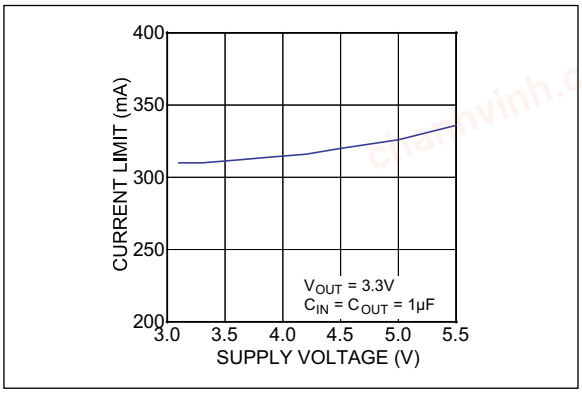



***FIGURE 2-10:*** *Current Limit vs. Supply Voltage.*

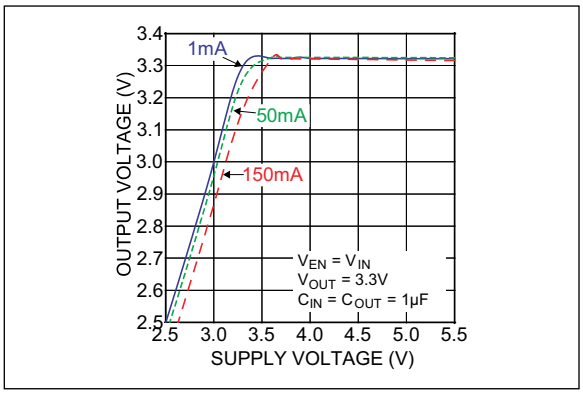



***FIGURE 2-8:*** *Output Voltage vs. Supply Voltage.*

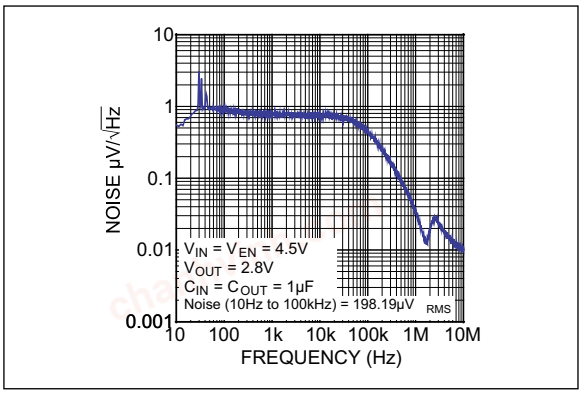



***FIGURE 2-11:*** *Output Noise Spectral Density.*

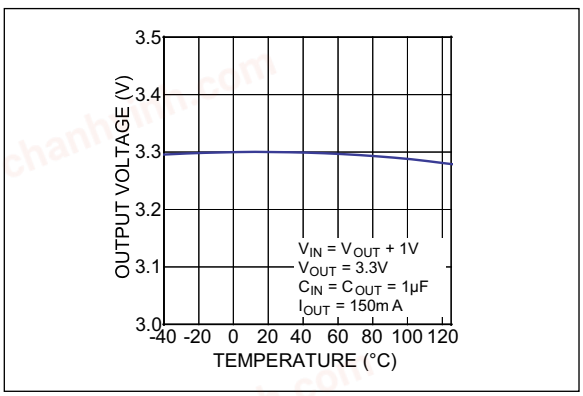



***FIGURE 2-9:*** *Output Voltage vs. Temperature.*

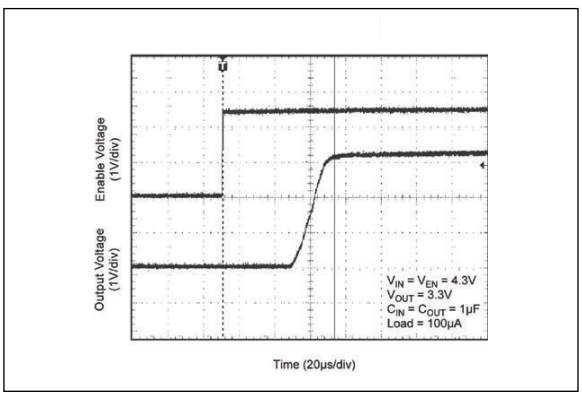



***FIGURE 2-12:*** *Enable Turn-On.*


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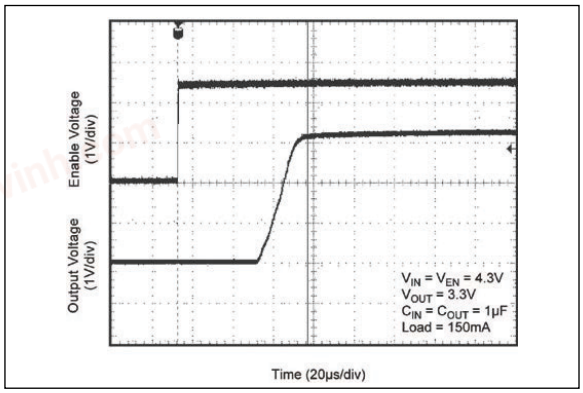



***FIGURE 2-13:*** *Enable Turn-On.*

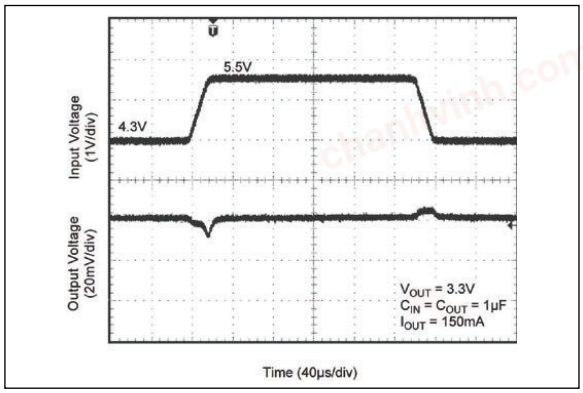



***FIGURE 2-16:*** *Line Transient.*

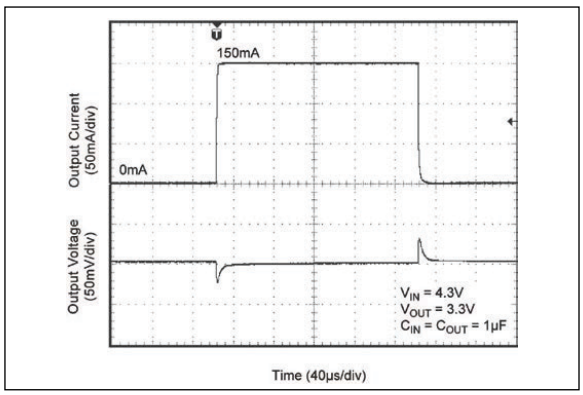



***FIGURE 2-14:*** *Load Transient.*

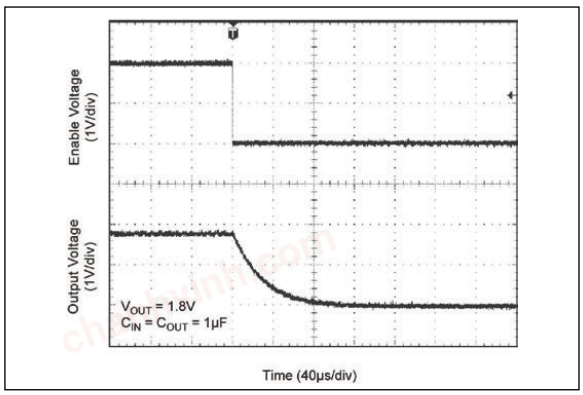



***FIGURE 2-17:*** *MIC5366 Auto Discharge (No Load).*

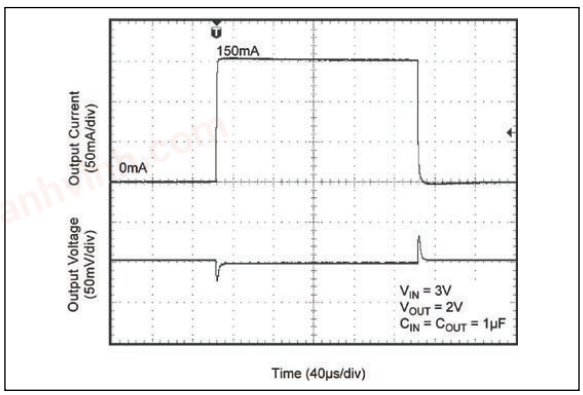



***FIGURE 2-15:*** *Load Transient.*

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## 3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

**TABLE 3-1: PIN FUNCTION TABLE**

| Pin Number | Pin Name UDFN-4 | Pin Name TSOT23-5 | Pin Name SC70-5 | Description |
|---|---|---|---|---|
| 1 | VOUT | — | — | Output Voltage. |
| 1 | — | VIN | VIN | Supply Input. |
| 2 | GND | GND | GND | Ground. |
| 3 | EN | EN | EN | Enable Input: Active-high. High = ON; Low = OFF. Do not leave floating. |
| 4 | VIN | — | — | Supply Input. |
| 4 | — | NC | NC | No Connect. Not internally connected. |
| 5 | — | VOUT | VOUT | Output Voltage. |
| EP | HS Pad | N/A | N/A | Exposed heat sink pad. |


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## 4.0 APPLICATION INFORMATION

MIC5365 and MIC5366 are low noise 150 mA LDOs. The MIC5366 includes an auto-discharge circuit that is switched on when the regulator is disabled through the enable pin. The MIC5365/6 regulator is fully protected from damage due to fault conditions, offering linear current limiting and thermal shutdown.

### 4.1 Input Capacitor

The MIC5365/6 is a high-performance, high-bandwidth device. An input capacitor of 1 µF capacitor is required from the input to ground to provide stability. Low-ESR ceramic capacitors provide optimal performance at a minimum of space. Additional high-frequency capacitors, such as small valued NPO dielectric type capacitors, help filter out high-frequency noise and are good practice in any RF-based circuit. X5R or X7R dielectrics are recommended for the input capacitor. Y5V dielectrics lose most of their capacitance over temperature and are therefore, not recommended.

### 4.2 Output Capacitor

The MIC5365/6 requires an output capacitor of 1 µF or greater to maintain stability. The design is optimized for use with low-ESR ceramic chip capacitors. High-ESR capacitors may cause high frequency oscillation. The output capacitor can be increased, but performance has been optimized for a 1 µF ceramic output capacitor and does not improve significantly with larger capacitance.

X7R/X5R dielectric-type ceramic capacitors are recommended because of their temperature performance. X7R type capacitors change capacitance by 15% over their operating temperature range and are the most stable type of ceramic capacitors. Z5U and Y5V dielectric capacitors change value by as much as 50% and 60%, respectively, over their operating temperature ranges. To use a ceramic chip capacitor with Y5V dielectric, the value must be much higher than an X7R ceramic capacitor to ensure the same minimum capacitance over the equivalent operating temperature range.

### 4.3 No-Load Stability

Unlike many other voltage regulators, the MIC5365/6 will remain stable and in regulation with no load. This is especially important in CMOS RAM to keep applications alive.

### 4.4 Enable/Shutdown

The MIC5365/6 comes with an active-high enable pin that allows the regulator to be disabled. Forcing the enable pin low disables the regulator and sends it into a “zero” off-mode current state. In this state, current consumed by the regulator goes nearly to zero. Forcing the enable pin high enables the output voltage. The active-high enable pin uses CMOS technology and the enable pin cannot be left floating; a floating enable pin may cause an indeterminate state on the output.

### 4.5 Thermal Considerations

The MIC5365/6 is designed to provide 150 mA of continuous current in a very small package. Maximum ambient operating temperature can be calculated based on the output current and the voltage drop across the part. For example if the input voltage is 3.6V, the output voltage is 2.8V, and the output current = 150 mA. The actual power dissipation of the regulator circuit can be determined using the equation Equation 4-1:

**EQUATION 4-1:**

$$P_D = (V_{IN} - V_{OUT})I_{OUT} + V_{IN} \times I_{GND}$$

Because this device is CMOS and the ground current is typically <100 µA over the load range, the power dissipation contributed by the ground current is <1% and can be ignored for the calculation in Equation 4-2:

**EQUATION 4-2:**

$$P_D = (3.6V - 2.8V) \times 150mA$$

$$P_D = 0.120W$$

To determine the maximum ambient operating temperature of the package, use the junction-to-ambient thermal resistance of the device and the following basic formula in Equation 4-3:

**EQUATION 4-3:**

$$P_{D(MAX)} = \left(\frac{T_{J(MAX)} - T_A}{\theta_{JA}}\right)$$

Where:

$T_{J(MAX)}$ = 125°C

$\theta_{JA}$ = 240°C/W (UDFN Package)
256.5°C/W (SC-70-5 Package)
235°C/W (TSOT23-5 Package)

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Substituting $P_D$ for $P_{D(MAX)}$ and solving for the ambient operating temperature will give the maximum operating conditions for the regulator circuit. The junction-to-ambient thermal resistance for the minimum footprint is 250°C/W.

The maximum power dissipation must not be exceeded for proper operation.

For example, when operating the MIC5365-2.8YMT at an input voltage of 3.6V and 150 mA loads at each output with a minimum footprint layout, the maximum ambient operating temperature $T_A$ can be determined in Equation 4-4:

**EQUATION 4-4:**

$$0.120W = (125°C - T_A)/(250°C/\mathrm{W})$$

$$T_A = 95°C$$

Therefore, the maximum ambient operating temperature of 95°C is allowed in a 1 mm × 1 mm UDFN package. For a full discussion of heat sinking and thermal effects of voltage regulators, refer to the "Regulator Thermals" section of Designing with Low-Dropout Voltage Regulators handbook.


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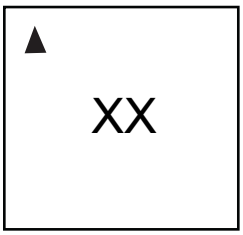
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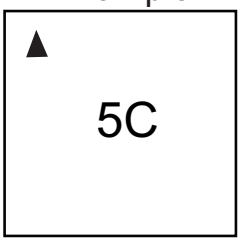
## 5.0 PACKAGING INFORMATION

### 5.1 Package Marking Information

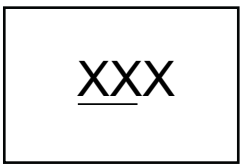
4-Lead UDFN*



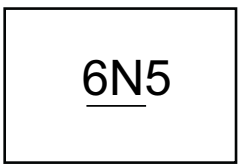

Example



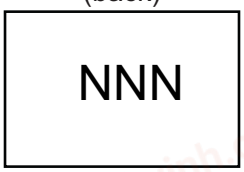

5-Lead SC70-5*
5-Lead TSOT23-5*
(front)



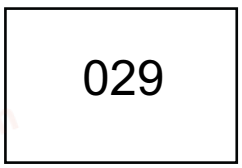

Example
(front)




5-Lead SC70-5*
5-Lead TSOT23-5*
(back)




Example
(back)




| | | |
|---|---|---|
| **Legend:** | XX...X | Product code or customer-specific information |
| | Y | Year code (last digit of calendar year) |
| | YY | Year code (last 2 digits of calendar year) |
| | WW | Week code (week of January 1 is week ‘01’) |
| | NNN | Alphanumeric traceability code |
| | (e3) | Pb-free JEDEC® designator for Matte Tin (Sn) |
| | * | This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package. |
| | ●, ▲, ▼ | Pin one index is identified by a dot, delta up, or delta down (triangle mark). |
| **Note**: | | In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo. |
| | | Underbar (_) and/or Overbar (‾) symbol may not be to scale. |

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**TABLE 5-1: PACKAGE MARKING CODES FOR MIC5365/6**

| Part Number | Output Voltage | Marking Codes |
|---|---|---|
| MIC5365-1.0YMT | 1.0V | 5C |
| MIC5365-1.2YMT | 1.2V | 54 |
| MIC5365-1.3YMT | 1.3V | 55 |
| MIC5365-1.5YMT | 1.5V | 5F |
| MIC5365-1.8YMT | 1.8V | 5G |
| MIC5365-2.0YMT | 2.0V | 5H |
| MIC5365-2.5YMT | 2.5V | 5J |
| MIC5365-2.6YMT | 2.6V | 5K |
| MIC5365-2.7YMT | 2.7V | 5L |
| MIC5365-2.8YMT | 2.8V | 5M |
| MIC5365-2.85YMT | 2.85V | 5N |
| MIC5365-2.9YMT | 2.9V | 5O |
| MIC5365-3.0YMT | 3.0V | 5P |
| MIC5365-3.3YMT | 3.3V | 5S |
| MIC5365-1.0YC5 | 1.0V | 65C |
| MIC5365-1.2YC5 | 1.2V | 654 |
| MIC5365-1.3YC5 | 1.3V | 655 |
| MIC5365-1.5YC5 | 1.5V | 65F |
| MIC5365-1.8YC5 | 1.8V | 65G |
| MIC5365-2.0YC5 | 2.0V | 65H |
| MIC5365-2.5YC5 | 2.5V | 65J |
| MIC5365-2.6YC5 | 2.6V | 65K |
| MIC5365-2.7YC5 | 2.7V | 65L |
| MIC5365-2.8YC5 | 2.8V | 65M |
| MIC5365-2.85YC5 | 2.85V | 65N |
| MIC5365-2.9YC5 | 2.9V | 65O |
| MIC5365-3.0YC5 | 3.0V | 65P |
| MIC5365-3.3YC5 | 3.3V | 65S |
| MIC5365-1.2YD5 | 1.2V | 645 |
| MIC5365-1.8YD5 | 1.8V | 6G5 |
| MIC5365-2.8YD5 | 2.8V | 6M5 |
| MIC5365-2.85YD5 | 2.85V | 6N5 |
| MIC5365-3.3YD5 | 3.3V | 6S5 |
| MIC5366-1.0YMT | 1.0V | 6C |
| MIC5366-1.2YMT | 1.2V | 64 |
| MIC5366-1.3YMT | 1.3V | 65 |
| MIC5366-1.5YMT | 1.5V | 6F |
| MIC5366-1.8YMT | 1.8V | 6G |
| MIC5366-2.0YMT | 2.0V | 6H |
| MIC5366-2.5YMT | 2.5V | 6J |
| MIC5366-2.6YMT | 2.6V | 6K |
| MIC5366-2.7YMT | 2.7V | 6L |
| MIC5366-2.8YMT | 2.8V | 6M |


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**TABLE 5-1: PACKAGE MARKING CODES FOR MIC5365/6**

| Part Number | Output Voltage | Marking Codes |
|---|---|---|
| MIC5366-2.85YMT | 2.85V | 6N |
| MIC5366-2.9YMT | 2.9V | 6O |
| MIC5366-3.0YMT | 3.0V | 6P |
| MIC5366-3.3YMT | 3.3V | 6S |
| MIC5366-1.0YC5 | 1.0V | 66C |
| MIC5366-1.2YC5 | 1.2V | 664 |
| MIC5366-1.3YC5 | 1.3V | 665 |
| MIC5366-1.5YC5 | 1.5V | 66F |
| MIC5366-1.8YC5 | 1.8V | 66G |
| MIC5366-2.0YC5 | 2.0V | 66H |
| MIC5366-2.5YC5 | 2.5V | 66J |
| MIC5366-2.6YC5 | 2.6V | 66K |
| MIC5366-2.7YC5 | 2.7V | 66L |
| MIC5366-2.8YC5 | 2.8V | 66M |
| MIC5366-2.85YC5 | 2.85V | 66N |
| MIC5366-2.9YC5 | 2.9V | 66O |
| MIC5366-3.0YC5 | 3.0V | 66P |
| MIC5366-3.3YC5 | 3.3V | 66S |

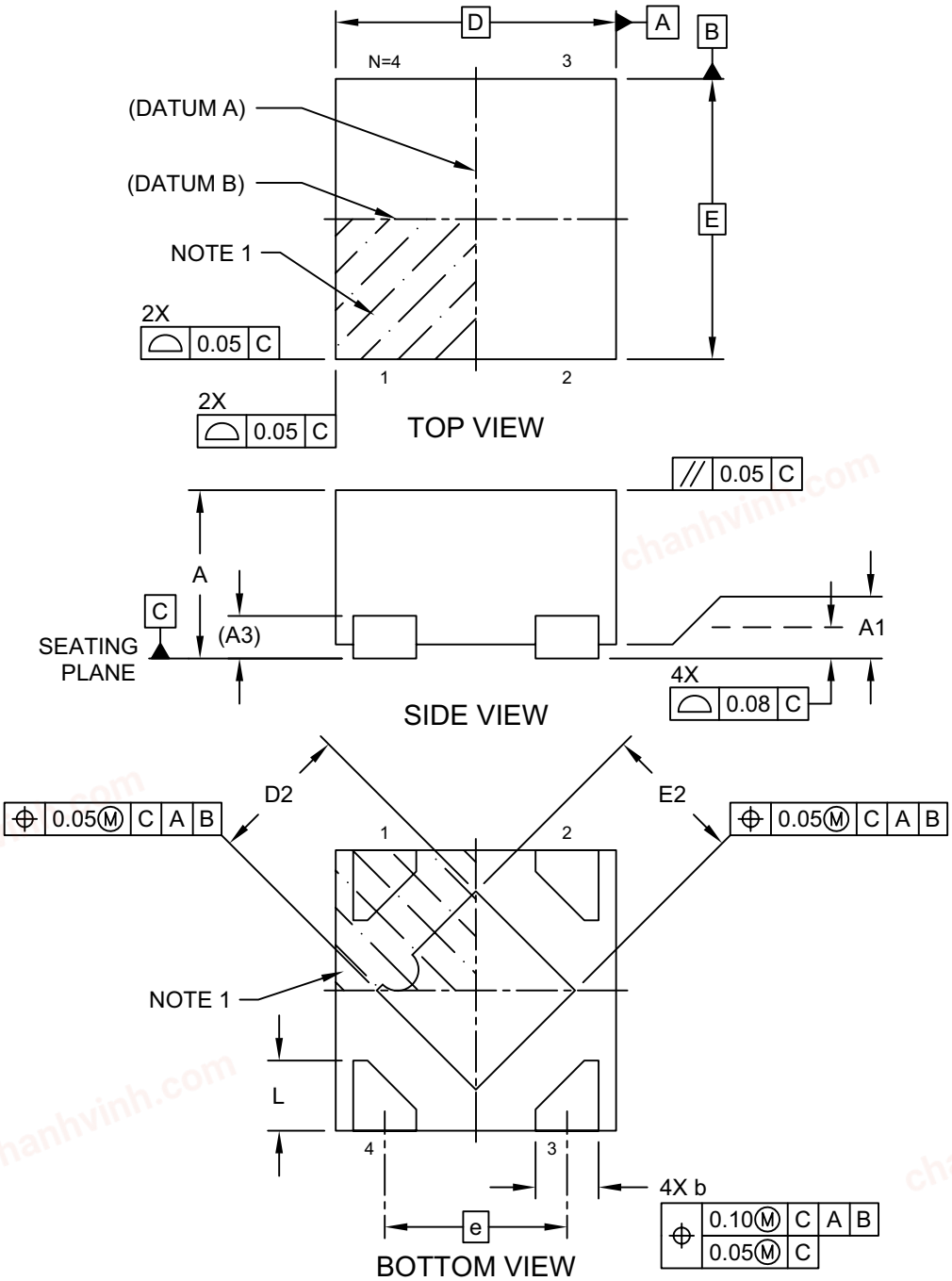
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## 4-Lead Ultra Thin Plastic Dual Flat, No Lead Package (HCA) - 1x1 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




Microchip Technology Drawing C04-1149 Rev A Sheet 1 of 2



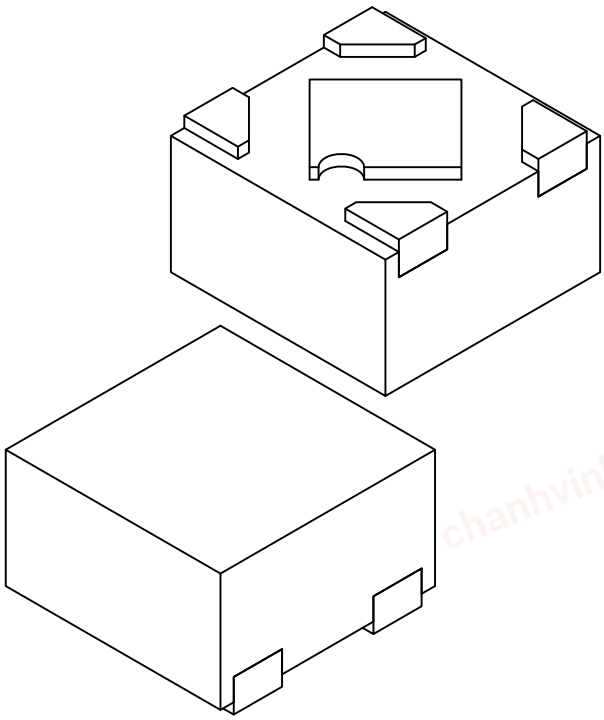
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## 4-Lead Ultra Thin Plastic Dual Flat, No Lead Package (HCA) - 1x1 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Number of Terminals | N | | 4 | |
| Pitch | e | | 0.65 BSC | |
| Overall Height | A | 0.50 | 0.55 | 0.60 |
| Standoff | A1 | 0.00 | 0.02 | 0.05 |
| Terminal Thickness | A3 | | 0.152 REF | |
| Overall Length | D | | 1.00 BSC | |
| Exposed Pad Length | D2 | 0.45 | 0.50 | 0.55 |
| Overall Width | E | | 1.00 BSC | |
| Exposed Pad Width | E2 | 0.45 | 0.50 | 0.55 |
| Terminal Width | b | 0.175 | 0.225 | 0.275 |
| Terminal Length | L | 0.20 | 0.25 | 0.30 |

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1149 Rev A Sheet 2 of 2

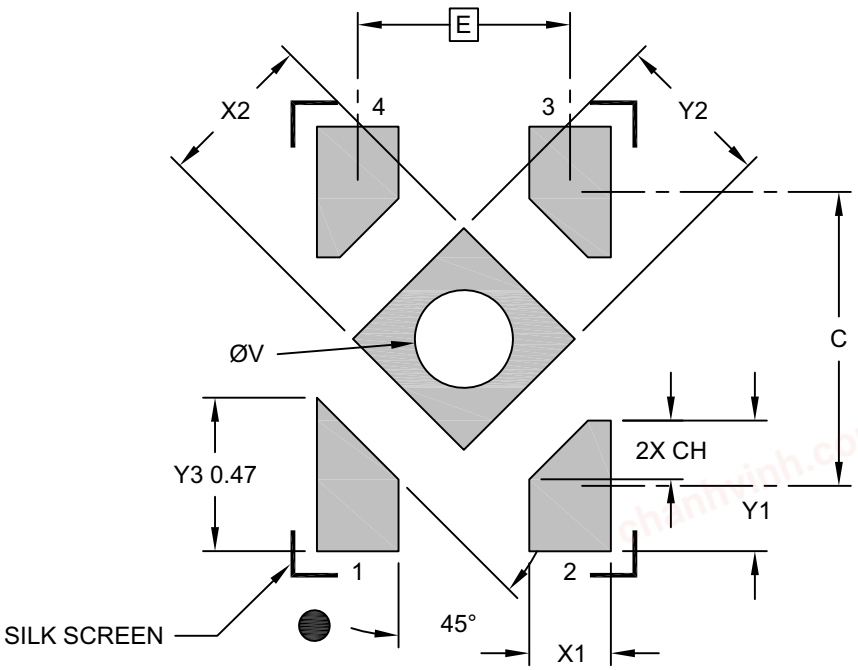
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## 4-Lead Ultra Thin Plastic Dual Flat, No Lead Package (HCA) - 1x1 mm Body [UDFN]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




RECOMMENDED LAND PATTERN

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Contact Pitch | E | | 0.65 BSC | |
| Center Pad Width | X2 | | | 0.48 |
| Center Pad Length | Y2 | | | 0.48 |
| Contact Pad Spacing | C | | 0.90 | |
| Contact Pad Width (X4) | X1 | | | 0.25 |
| Contact Pad Length (X3) | Y1 | | | 0.40 |
| Terminal 1 Pad Length | Y3 | | | 0.47 |
| Contact Pad Chamfer (X3) | CH | | 0.18 | |
| Thermal Via Diameter | V | | 0.30 | |

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
2. For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

Microchip Technology Drawing C04-3149 Rev A

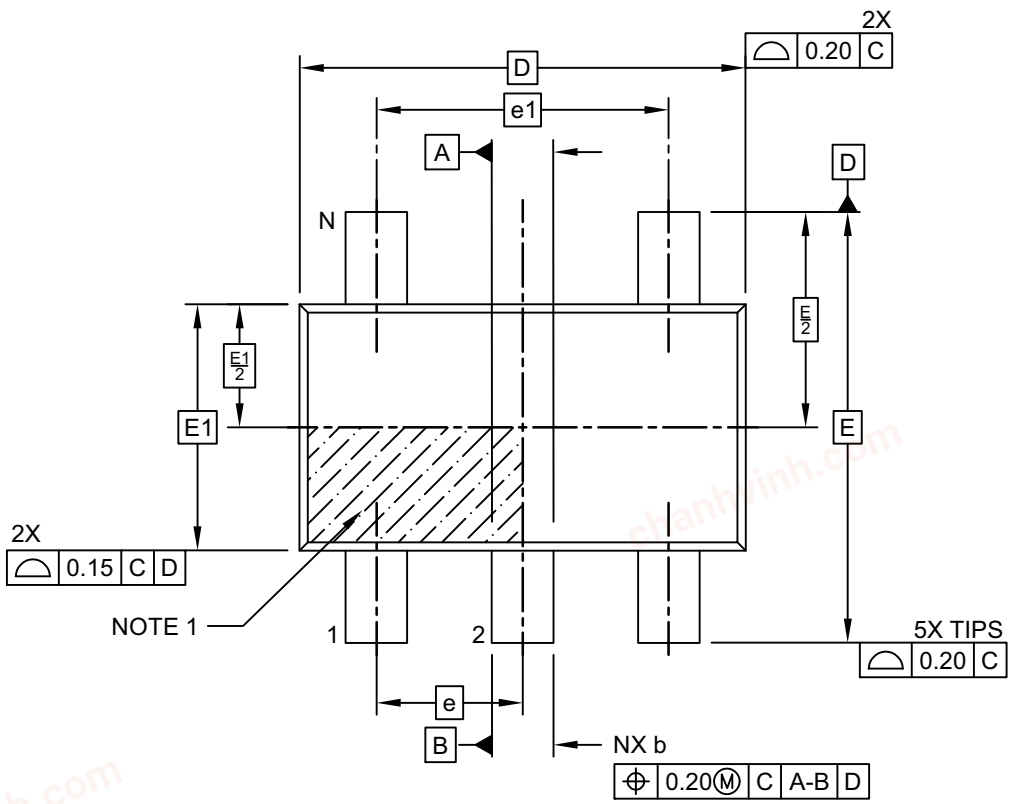

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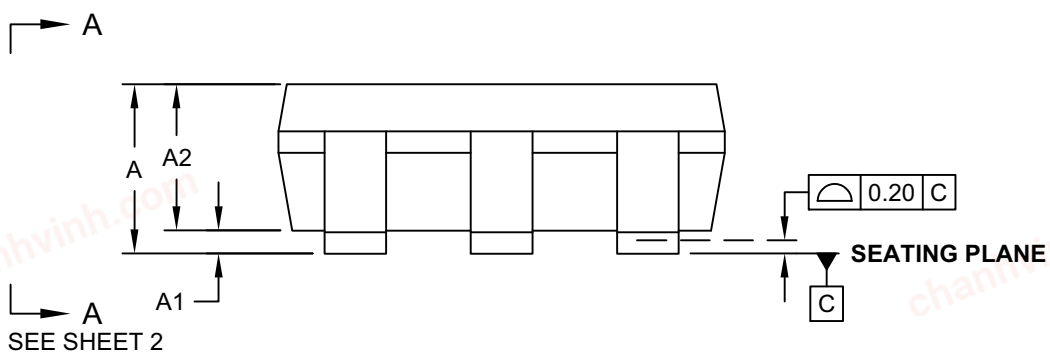


## 5-Lead Plastic Thin Small Outline Transistor (D5A) [TSOT]
## Micrel Legacy Package TSOT-5LD-PL-1

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




TOP VIEW




SIDE VIEW

Microchip Technology Drawing C04-1179 Rev A Sheet 1 of 2

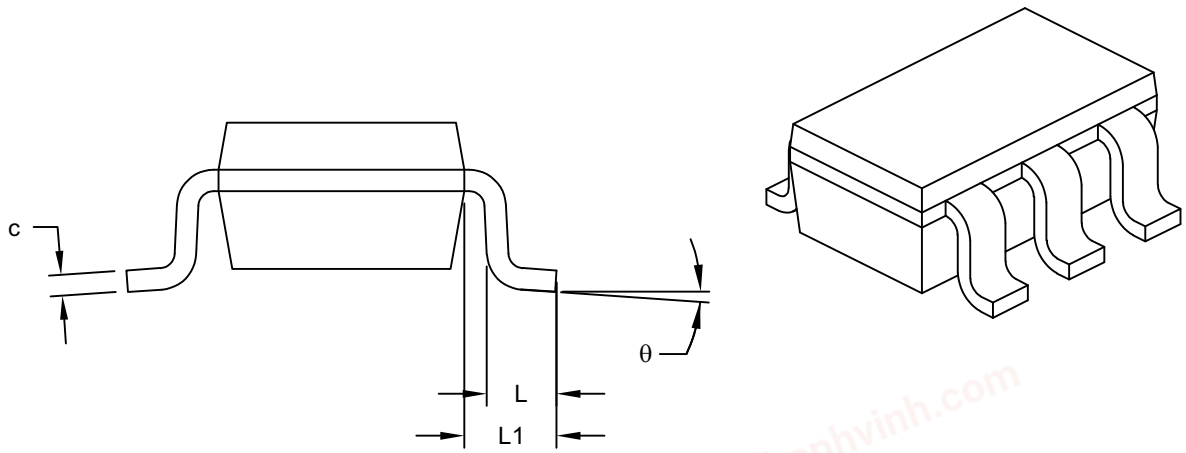
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## 5-Lead Plastic Thin Small Outline Transistor (D5A) [TSOT]
## Micrel Legacy Package TSOT-5LD-PL-1

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




VIEW A-A
SHEET 1

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Number of Leads | N | | 5 | |
| Pitch | e | | 0.95 BSC | |
| Outside lead pitch | e1 | | 1.90 BSC | |
| Overall Height | A | - | - | 1.00 |
| Molded Package Thickness | A2 | 0.84 | 0.87 | 0.90 |
| Standoff | A1 | 0.00 | - | 0.10 |
| Overall Width | E | | 2.80 BSC | |
| Molded Package Width | E1 | | 1.60 BSC | |
| Overall Length | D | | 2.90 BSC | |
| Foot Length | L | 0.30 | 0.40 | 0.50 |
| Footprint | L1 | | 0.60 REF | |
| Foot Angle | ϕ | 0° | - | 4° |
| Lead Thickness | c | | 0.127 REF | |
| Lead Width | b | 0.30 | - | 0.50 |

Notes:
1. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1179 Rev A Sheet 1 of 2

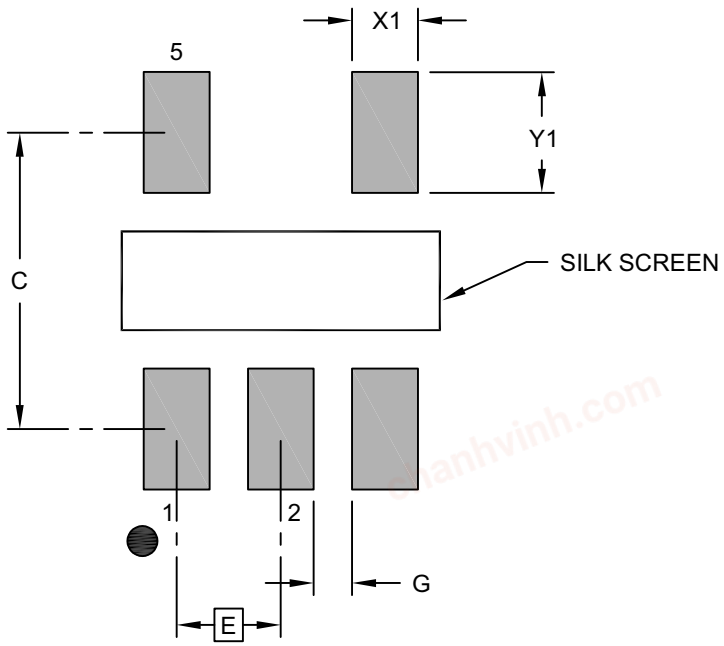

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## 5-Lead Plastic Thin Small Outline Transistor (D5A) [TSOT]
## Micrel Legacy Package TSOT-5LD-PL-1

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




RECOMMENDED LAND PATTERN

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Contact Pitch | E | | 0.95 BSC | |
| Contact Pad Spacing | C | | 2.60 | |
| Contact Pad Width (X5) | X1 | | | 0.60 |
| Contact Pad Length (X5) | Y1 | | | 1.10 |
| Contact Pad to Center Pad (X2) | G | 0.20 | | |

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-3179 Rev A

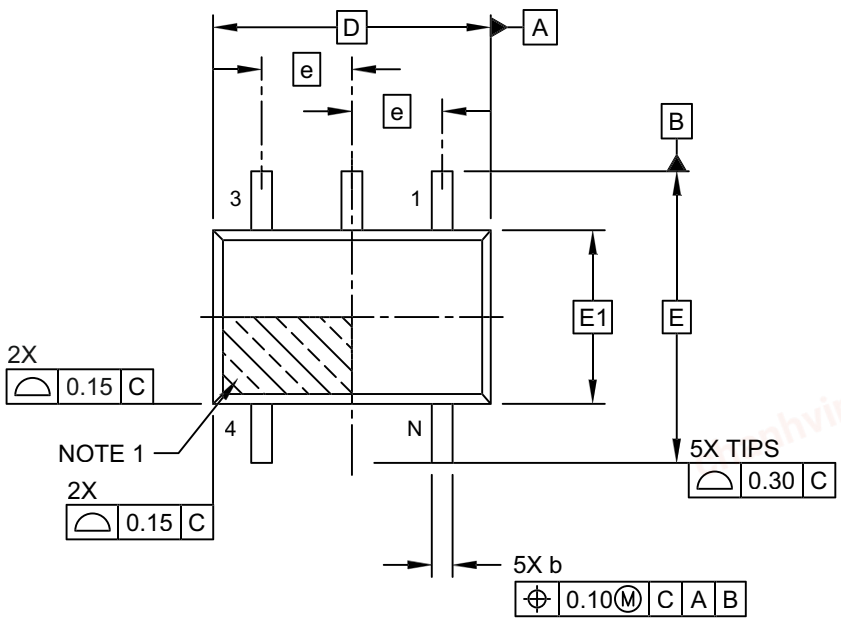
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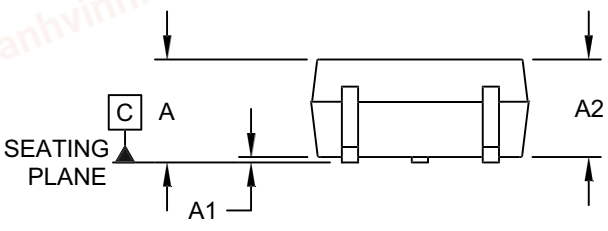


## 5-Lead Plastic Small Outline Transistor (D3A) [SC70] Micrel Legacy Package: YC

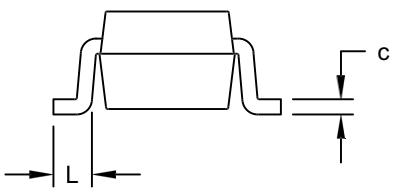
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




TOP VIEW




SIDE VIEW




END VIEW

Microchip Technology Drawing C04-01132 Rev A Sheet 1 of 2

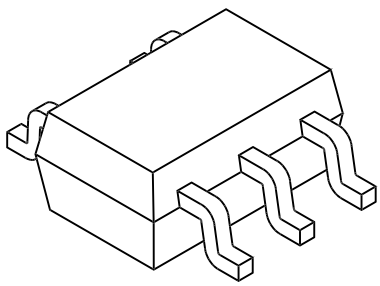

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## 5-Lead Plastic Small Outline Transistor (D3A) [SC70] Micrel Legacy Package: YC

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Number of Pins | N | | 5 | |
| Pitch | e | | 0.65 BSC | |
| Overall Height | A | 0.80 | 0.95 | 1.10 |
| Standoff | A1 | 0.00 | 0.05 | 0.10 |
| Molded Package Thickness | A2 | 0.80 | 0.90 | 1.00 |
| Overall Length | D | 1.80 | 2.00 | 2.25 |
| Overall Width | E | 1.80 | 2.10 | 2.40 |
| Molded Package Width | E1 | 1.15 | 1.25 | 1.35 |
| Terminal Width | b | 0.15 | - | 0.30 |
| Terminal Length | L | 0.21 | - | 0.46 |
| Lead Thickness | c | 0.08 | - | 0.30 |

Notes:

1. The Pin 1 visual index feature may vary, but it must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
3. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

REF: Reference Dimension, usually without tolerances, for information purposes only.

Microchip Technology Drawing C04-01132 Rev A Sheet 2 of 2

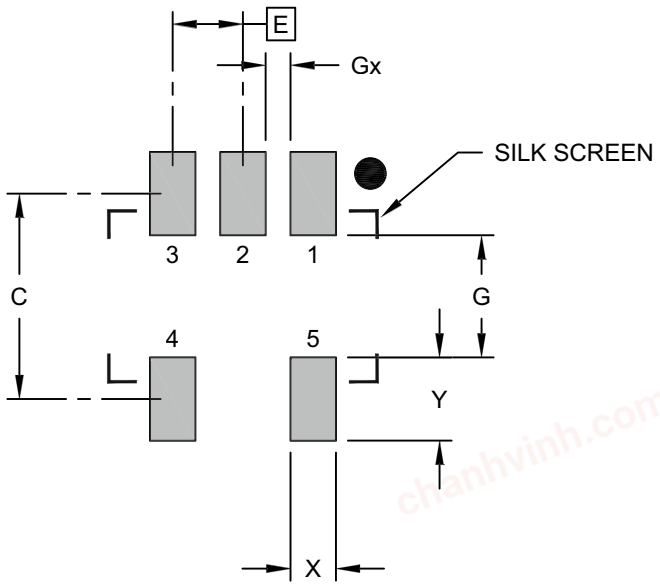
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## 5-Lead Plastic Small Outline Transistor (D3A) [SC70] Micrel Legacy Package: YC

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging




RECOMMENDED LAND PATTERN

| Units | | MILLIMETERS | | |
|---|---|---|---|---|
| Dimension Limits | | MIN | NOM | MAX |
| Contact Pitch | E | | 0.65 BSC | |
| Contact Pad Spacing | C | | 1.90 | |
| Contact Pad Width | X | | | 0.42 |
| Contact Pad Length | Y | | | 0.77 |
| Distance Between Pads | G | 1.13 | | |
| Distance Between Pads | Gx | 0.23 | | |

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-03132 Rev A


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# APPENDIX A: REVISION HISTORY

## Revision B (April 2026)

- Corrected typos in Functional Block Diagrams and Table 5-1.
- Updated TDFN references to UDFN instead throughout document.
- Updated **Section 5.1 "Package Marking Information"** with markings on back of TSOT option.
- Updated Package Drawings in **Section 5.0 "Packaging Information"**.
- Fixed voltage option details throughout Product Identification System page.

## Revision A (October 2021)

- Converted Micrel document MIC5365/6 to Microchip data sheet DS20006605A.
- Minor text changes throughout.
- Evaluation Board Schematic and BOM sections from original data sheet moved to the part's Evaluation Board User's Guide.

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## PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

| PART NO. | -XXX | X | XX | -XX |
|---|---|---|---|---|
| Device | Voltage Option | Junction Temperature Range | Package | Media Type |

| | | |
|---|---|---|
| **Device:** | MIC5365: High-Performance Single 150 mA LDO<br>MIC5366: High-Performance Single 150 mA LDO with Output Discharge Circuit | |
| **Voltage Options** | 1.0 = 1.0V<br>1.2 = 1.2V<br>1.3 = 1.3V<br>1.5 = 1.5V<br>1.8 = 1.8V<br>2.0 = 2.0V<br>2.5 = 2.5V<br>2.6 = 2.6V<br>2.7 = 2.7V<br>2.8 = 2.8V<br>2.85 = 2.85V<br>2.9 = 2.9V<br>3.0 = 3.0V<br>3.3 = 3.3V | |
| **Junction Temperature Range:** | Y = | -40°C to +125°C (RoHS Compliant) |
| **Package:** | MT = | 4-Lead 1 mm x 1 mm UDFN Package (Pb-Free) (MIC5365/6) |
| | C5 = | 5-Lead SC-70 Package (Pb-Free) (MIC5365/6) |
| | D5 = | 5-Lead TSOT-23 Package (Pb-Free) (MIC5365 Only) |
| **Media Type:** | T5 = | 500/Reel |
| | TR = | 3,000/Reel (for package options C5 and D5 only) |
| | TR = | 5,000/Reel (for package option MT only) |
| | TZ = | 10,000/Reel (for package option MT only) |

**Examples:**

| | |
|---|---|
| a) MIC5365-1.2YD5-T5 | High-Performance Single 150 mA LDO, 1.2V, -40°C to +125°C, 5-Lead TSOT23-5 Package, 500/Reel |
| b) MIC5365-2.8YC5-TR | High-Performance Single 150 mA LDO, 2.8V, -40°C to +125°C, 5-Lead SC-70-5 Package, 3,000/Reel |
| c) MIC5365-2.85YMT-TZ | High-Performance Single 150 mA LDO, 2.85V, -40°C to +125°C, 4-Lead UDFN Package, 10,000/Reel |
| e) MIC5366-2.7YC5-TR | High-Performance Single 150 mA LDO, 2.7V, -40°C to +125°C, 5-Lead SC-70-5 Package, 3,000/Reel |
| f) MIC5366-2.9YMT-TZ | High-Performance Single 150 mA LDO, 2.9V, -40°C to +125°C, 4-Lead UDFN Package, 10,000/Reel |

**Note 1:** Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

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ISBN: 979-8-3371-3193-1

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