

1.2V - 8V, 3A PFET High Side Load Switch with Level Shift & Adjustable Slew Rate Control

Check for Samples: [TPS27081A](#)

FEATURES

- **Low ON Resistance, High Current PFET**
 - $R_{ON} = 32m\Omega$ at $V_{GS} = -4.5V$
 - $R_{ON} = 44m\Omega$ at $V_{GS} = -3.0V$
 - $R_{ON} = 82m\Omega$ at $V_{GS} = -1.8V$
 - $R_{ON} = 93m\Omega$ at $V_{GS} = -1.5V$
 - $R_{ON} = 155m\Omega$ at $V_{GS} = -1.2V$
- **Adjustable Turn-ON and Turn-OFF Slew Rate Control Through External R1, R2, and C1**
- **Supports a Wide Range of 1.2V up to 8V Supply Inputs**
- **Integrated NMOS for PFET Control**
- **NMOS ON/OFF Supports a Wide Range of 1.0V up to 8V Control Logic Interface**
- **Full ESD Protection (All Pins)**
 - HBM 2kV, CDM 500V
- **Ultra Low Leakage Current in Stand-by (Typ 100nA)**
- **Available in Tiny 6-pin Package**
 - 2.9mm x 2.8mm x 0.75mm Thin SOT-23 (DDC)

APPLICATIONS

- High Side Load Switch
- Inrush-current control
- Power Sequencing and Control
- Stand-by Power Isolation
- Portable Power Switch

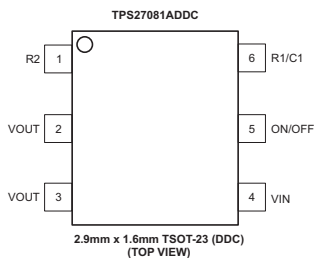


Figure 1. TPS27081A Packages

DESCRIPTION

The TPS27081A IC is a high side load switch that integrates a Power PFET and a Control NFET in a tiny package.

The TPS27081A features industry-standard ESD protection on all pins providing better ESD compatibility with other on-board components.

The TPS27081A level shifts ON/OFF logic signal to VIN levels and supports as low as 1.0V CPU or MCU logic to control higher voltage power supplies without requiring an external level-shifter.

Switching a large value output capacitor CL through a fast ON/OFF logic signal may result in an excessive inrush current. To control the load inrush current, connect a resistor R2 as shown in Figure 2. To further limit the inrush current add an external capacitor C1. To configure the TPS27081A to achieve a specific slew rate refer to the Application Information section.

A single pull-up resistor R1 is required in stand-by power switch applications that do not require inrush current control. In such applications connect the TPS27081A pin R2 to the system ground.

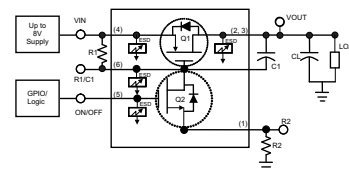


Figure 2. Simplified Block & Application Diagram

Component Table (Typical Application)

| COMPONENT | DESCRIPTION |
|-----------|------------------------------|
| R1 | Level Shift/Pull-up Resistor |
| R2 | Optional ⁽¹⁾ |
| C1 | Optional ⁽¹⁾ |

(1) Required for load inrush current (slew rate) control



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ORDERING INFORMATION⁽¹⁾

| T _A | PART NUMBER | PACKAGE | | TOP-SIDE MARKING ⁽²⁾ |
|----------------|---------------|----------------|--------------|---------------------------------|
| –40°C to 85°C | TPS27081ADDCR | 6-Pin Thin SOT | Reel of 3000 | AU_ |

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.
 (2) DDC: The actual top-side marking has one additional character that designates the wafer fab/assembly site.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾⁽²⁾

Specified at T_J = –40°C to 105°C unless otherwise noted.

| | | VALUE | | UNIT |
|--|---|-------|-------------------|------|
| | | MIN | MAX | |
| V _{INmax} , V _{OUTmax} | V _{IN} , V _{OUT} pin Maximum Voltage with reference to pin R2 | –0.1 | 8 | V |
| V _{ON/OFF} | ON/OFF Pin max Voltage with respect to Pin R2 | –0.3 | 8 | V |
| I _{Q1-ON} | Max Continuous Drain Current of Q1 at T _J = 105°C | | 3 | A |
| | Max Pulsed Drain Current of Q1 ⁽³⁾ at T _J = 105°C | | 9.5 | |
| P _D | Max power dissipation at T _A = 25°C, T _J = 150°C | | 1190 | mW |
| All pins | ESD Rating – HBM | | 2000 | V |
| | ESD Rating – CDM | | 500 | |
| T _A | Operating free-air ambient temperature range | –40 | 85 ⁽⁴⁾ | °C |
| T _{J-max} ⁽⁵⁾ | Operating virtual junction temperature | | 150 | °C |
| T _{stg} | Storage temperature range | –65 | 150 | °C |

- (1) Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
 (2) Refer to TI's design support web page at www.ti.com/thermal for improving device thermal performance
 (3) Pulse Width <300us, Duty Cycle <2%
 (4) T_{J-max} limits and other related conditions apply. Refer to SOA charts, [Figure 17](#) through [Figure 21](#)
 (5) Operating at the absolute T_{J-max} of 150°C can affect reliability – for higher reliability it is recommended to ensure T_J <105°C

DISSIPATION RATINGS⁽¹⁾⁽²⁾⁽³⁾

| BOARD | PACKAGE | θ _{JC} | θ _{JA} ⁽⁴⁾ | T _A < 25°C | T _A = 70°C | T _A = 85°C | DERATING FACTOR ABOVE T _A = 25°C |
|--------------------|----------------------|-----------------|--------------------------------|-----------------------|-----------------------|-----------------------|---|
| High-K(JEDEC 51-7) | 6-Pin Thin SOT (DDC) | 43°C/W | 105°C/W | 1190 mW | 760 mW | 619 mW | 9.55 mW/°C |

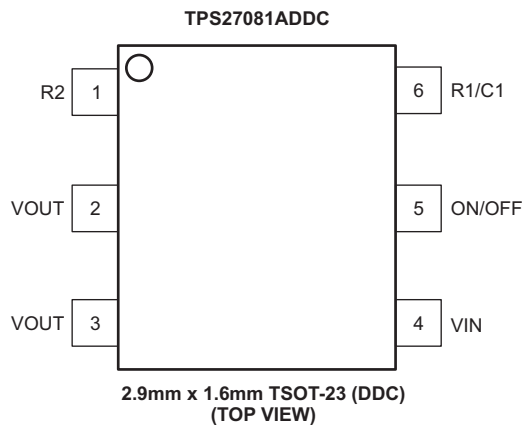
- (1) Refer to TI's design support web page at www.ti.com/thermal for improving device thermal performance.
 (2) Maximum dissipation values for retaining a maximum allowable device junction temperature of 150°C
 (3) Package thermal data based on a 76x114x1.6mm, 4-layer board with 2-oz Copper on outer layers
 (4) Operating at the absolute T_{J-max} of 150°C can affect reliability; T_J ≤ 105°C is recommended

ELECTRICAL CHARACTERISTICS

Specified over the recommended junction temperature range $T_J = -40^{\circ}\text{C}$ to 105°C unless otherwise noted. Typical values specified at $T_A = T_J = 25^{\circ}\text{C}$.

| PARAMETER | | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|--|---|--|--------------------------------------|-------|-------|------|------|
| OFF CHARACTERISTICS | | | | | | | |
| BV _{IN} | Q1 drain-to-source breakdown voltage | V _{ON/OFF} = 0 V, VGS(Q1) = 0V, ID(Q1) = 250 μA | | -8 | | | V |
| I _{LOAD} ⁽¹⁾ | VIN Pin total leakage current | V _{IN} = 8V, V _{ON/OFF} = 0V, R1 = 10k Ω | T _J = 25°C | 0.15 | 0.75 | | μA |
| | | | T _J = 85°C ⁽²⁾ | 5 | 20 | | |
| I _{LOAD} ⁽¹⁾ | VIN Pin total leakage current | V _{IN} = 5V, V _{ON/OFF} = 0V, R1 = 10k Ω | T _J = 25°C | 0.05 | | | μA |
| | | | T _J = 85°C ⁽²⁾ | 2 | | | |
| IF _{Q2} | Q2 drain-to-source leakage current | V _{IN} = 8V, V _{ON/OFF} = 0V | T _J = 25°C | 0.030 | 0.050 | | uA |
| | | | T _J = 85°C ⁽²⁾ | 0.350 | 0.600 | | |
| IF _{Q2} | Q2 drain-to-source leakage current | V _{IN} = 5V, V _{ON/OFF} = 0V | T _J = 25°C | 0.025 | | | μA |
| | | | T _J = 85°C ⁽²⁾ | 0.250 | | | |
| ON CHARACTERISTICS ⁽³⁾ | | | | | | | |
| VIL | ON/OFF pin low-level input voltage | V _{IN} = 5.0V, ID(Q1) < 2μA, R1 = 10kΩ, R2 = RL = 0Ω | T _J = 25°C | 0.3 | | | V |
| | | V _{IN} = 5.0V, ID(Q1) < 20μA, R1 = 10kΩ, R2 = RL = 0Ω | T _J = 85°C ⁽²⁾ | 0.2 | | | |
| VIH | ON/OFF pin high-level input voltage | VIN=5.0V, R1=10kΩ | | 1.0 | | | V |
| R _{Q1(ON)} | Q1 Channel ON resistance ⁽⁴⁾ | VGS = -4.5 V, ID(Q1) = 3.0 A | | 32 | | 55 | mΩ |
| | | VGS = -3.0 V, ID(Q1) = 2.5 A | | 44 | | 77 | |
| | | VGS = -2.5 V, ID(Q1) = 2.5 A | | 50 | | 85 | |
| | | VGS = -1.8 V, ID(Q1) = 2.0 A | | 82 | | 147 | |
| | | VGS = -1.5 V, ID(Q1) = 1.0 A | | 93 | | 166 | |
| | | VGS = -1.2 V, ID(Q1) = 0.5 A | | 155 | | 260 | |
| R _{Q2(ON)} | Q2 Channel ON resistance | VGS = 4.5 V, ID(Q2) = 0.4 A | | 1.8 | | 3 | Ω |
| | | VGS = 3.0 V, ID(Q2) = 0.3 A | | 2.3 | | 6.2 | |
| | | VGS = 2.5 V, ID(Q2) = 0.2 A | | 2.6 | | 6.1 | |
| | | VGS = 1.8 V, ID(Q2) = 0.1 A | | 3.8 | | 10 | |
| | | VGS = 1.5 V, ID(Q2) = 0.05 A | | 4.4 | | 8.5 | |
| | | VGS = 1.2 V, ID(Q2) = 0.03 A | | 6.25 | | 13.5 | |
| Q1 DRAIN-SOURCE DIODE PARAMETERS ⁽³⁾⁽⁵⁾ | | | | | | | |
| IF _{SD} | Source-drain diode peak forward current | VF _{SD} = 0.8 V, V _{ON/OFF} = 0 V | | 1.0 | | | A |
| VF _{SD} | Source-drain diode forward voltage | V _{ON/OFF} = 0 V, IF _{SD} = -0.6A, | | | | 1.0 | V |

- (1) Pull-up Resistor R1 dependent
- (2) Guaranteed by design only
- (3) Pulse width $< 300\text{ }\mu\text{s}$, Duty Cycle $< 2.0\%$
- (4) Refer to SOA charts for current rating
- (5) Not rated for continuous current operation

DEVICE INFORMATION**TPS27081A PIN DESCRIPTION**

| PIN | | DESCRIPTION |
|--------|--------|---|
| NAME | NUMBER | |
| R2 | 1 | Source Terminal of NMOS (Q2) - Connect to system GND directly or through a slew rate control resistor |
| VOUT | 2, 3 | Drain Terminal of Power PFET (Q1) - Connect a slew control capacitor between pins VOUT and R1/C1 |
| VIN | 4 | Source Terminal of Power PFET (Q1) - connect a pull-up resistor between the pins VIN/R1 and R1/C1 |
| ON/OFF | 5 | Active high enable pin – when driven with a high impedance driver connect an external pull down resistor to GND |
| R1/C1 | 6 | Gate Terminal of Power PFET (Q1) |

APPLICATION INFORMATION

The TPS27081A IC is a high side load switch that integrates a Power PFET and a Control NMOS in a tiny package. The TPS27081A internal components are rated for up to 8V supply and support up to 3A of load current. The TPS27081A can be used in a variety applications. [Figure 3](#) below shows a general application of TPS27081A to control the load inrush current.

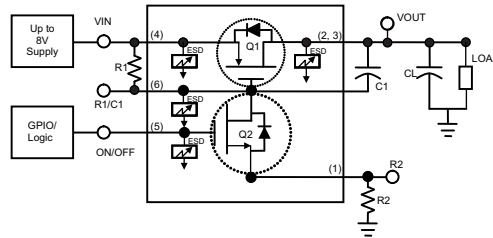


Figure 3. Typical Application Diagram

Configuring Q1 ON Resistance

The V_{GS-Q1} Gate-Source voltage across the PMOS transistor Q1 sets its ON resistance $R_{Q1(ON)}$. Directly connecting the pin R2 to ground maximizes the ON state V_{GS-Q1} and thus minimizes the VIN to VOUT voltage dropout. When a resistor R2 is installed to control the Turn-ON slew rate then V_{GS-Q1} is given by:

$$V_{GS-Q1} = -VIN \times \frac{R1}{R1 + R2} V$$

e.g. $R1 = 10 \times R2$, $VIN = 5V$ sets $V_{GS-Q1} = -4.5V$ (1)

Note: It is recommended to keep $R1 > 10 \times R2$. Higher value of resistor R1 minimizes quiescent current when is PMOS is on, however may adversely impact off state leakage current. Refer to the ILoad parameter in the [ELECTRICAL CHARACTERISTICS](#).

Configuring Turn-ON Slew Rate

Switching a large capacitive load CL instantaneously results in a load inrush current given by the following equation:

$$I_{inrush} = C_{load} \times \frac{dv}{dt} = C_{load} \times \frac{VOUT_{final} - VOUT_{initial}}{Vout \text{ Slew Rate}} \quad (2)$$

An uncontrolled fast rising ON/OFF logic input may result in a high slew rate at the output resulting in a very high dv/dt thus leading to a higher inrush current. To control the inrush current connect a resistor R2 and a capacitor C1 as shown in the [Electrical Characteristics Table](#). Use the following equation to configure the TPS27081A slew rate to a specific value. Refer to [Table 1](#) for component values to configure TPS27081A to achieve standard slew rates.

$$t_{rise} = \frac{3.9 \times R2 \times C1}{VIN^{2/3}} \text{ sec} \quad (3)$$

Where t_{rise} is the time delta starting from the ON/OFF signal's rising edge to charge up the load capacitor CL from 10% to 90% of VIN voltage.

Note: The t_{rise} equation is accurate to within +/-20% across full VIN range supported by TPS27081A. Ensure that $R1 > 10 \times R2$.

Table 1. Component Values for VOUT Rise Time

| C1 ⁽¹⁾ | Rise Time (μs) ⁽²⁾⁽³⁾ | | | | | | | |
|-------------------|----------------------------------|----------|------------|------------|-------------------|----------|------------|------------|
| | R1=10kΩ, R2=1kΩ | | | | R1=5.1kΩ, R2=510Ω | | | |
| | VIN = 7V | VIN = 5V | VIN = 3.3V | VIN = 1.2V | VIN = 7V | VIN = 5V | VIN = 3.3V | VIN = 1.2V |
| 220pF | .253 | .316 | .416 | .810 | .129 | .161 | .212 | .413 |
| 1000pF | 1.15 | 1.44 | 1.89 | 3.68 | .586 | .732 | .963 | 1.88 |
| 4700pF | 5.4 | 6.75 | 8.88 | 17.3 | 2.76 | 3.44 | 4.53 | 8.83 |
| 0.18μF | 207 | 258 | 340 | 663 | 106 | 132 | 173 | 338 |
| 0.27μF | 310 | 388 | 510 | 994 | 158 | 198 | 260 | 507 |
| 0.33μF | 379 | 474 | 623 | 1220 | 194 | 242 | 318 | 620 |
| 1μF | 1150 | 1440 | 1890 | 3680 | 586 | 732 | 963 | 1880 |

(1) Typical ceramic capacitor values

(2) CLoad=10μF. Output rise time is independent of CLoad when CLoad >> C1

(3) Rise Time is 250ns for R2=0Ω and C1=CLoad=0F

Configuring Turn-OFF Delay

TPS27081A PMOS turn-off delay from the falling edge of ON/OFF logic signal depends upon the component values of resistor R1 & capacitor C1. Lower values of resistor R1 ensures quicker turn-off.

$$t_{off} > 2 \times R1 \times C1 \text{ sec}$$

Low Voltage ON/OFF Interface

The VGS_{Q2} is set by the ON/OFF logic level. To turn ON, the transistor Q2 requires a VGS > 1.0V (Typical). For reliable operation apply ON/OFF logic that has the following VIH and VIL limits:

$$VIH_{ON} > 1.0V + I_{Q2} \times R2 \text{ V}$$

$$VIL_{OFF} < 0.2 \text{ V}$$

Minimizing I_{Q2} × R2 drop helps achieve a direct interface with a low voltage ON/OFF logic. To minimize I_{Q2} × R2 voltage drop select a high R1/R2 ratio. E.g. When VIN= 1.8V, selecting R1/R2 = 40 will require VIH > 1.0 + 45mV and thus allowing a 1.2V GPIO interface.

In applications where ON/OFF signal is not available connect ON/OFF pin to VIN. The TPS27081A will turn ON/OFF in sync with the input supply connected to VIN.

Note: Connect a pull down resistor between ON/OFF pin to GND when ON/OFF is driven by a high-impedance (tri-state) driver.

On-Chip Power Dissipation

Use the below equation to calculate TPS27081A on-chip power dissipation PD:

$$PD = ID_{Q1}^2 \times R_{Q1(ON)} + ID_{Q2}^2 \times R_{Q2(ON)}$$

Where, ID_{Q1} and ID_{Q2} are the DC current flowing through the transistors Q1 and Q2 respectively. Refer to the [ELECTRICAL CHARACTERISTICS](#) table and/or [Figure 10](#) through [Figure 16](#) to estimate R_{Q1(ON)} and R_{Q2(ON)} for various values of VGS_{Q1} and VGS_{Q2} respectively.

Note: MOS switches can get extremely hot when operated in saturation region. As a general guideline, to avoid transistors Q1 and Q2 going into saturation region set VGS > VT +VDS. E.g. VGS > 1.5V and VDS < 200mV ensures operation as a switch.

Thermal Reliability

For higher reliability it is recommended to limit TPS27081A IC's die junction temperature to less than 105°C. The IC junction temperature is directly proportional to the on-chip power dissipation. Use the following equation to calculate maximum on-chip power dissipation to achieve the maximum die junction temperature target:

$$PD_{(MAX)} = \frac{(T_{J(MAX)} - T_A)}{\theta_{JA}}$$

Where:

$T_{J(MAX)}$ is the target maximum junction temperature.

T_A is the operating ambient temperature.

$R_{\theta JA}$ is the package junction to ambient thermal resistance.

(4)

Improving Package Thermal Performance

The package θ_{JA} value under standard conditions on a High-K board is listed in the [DISSIPATION RATINGS](#). θ_{JA} value depends on the PC board layout. An external heat sink and/or a cooling mechanism, like a cold air fan, can help reduce θ_{JA} and thus improve device thermal capabilities. Refer to TI's design support web page at www.ti.com/thermal for a general guidance on improving device thermal performance.

APPLICATION EXAMPLES

TFT LCD Module Inrush Current Control

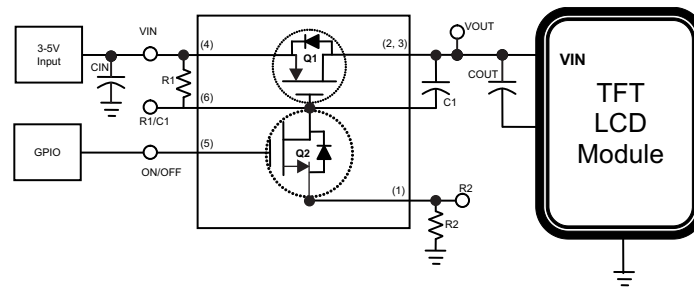


Figure 4. Inrush Current Control Using TPS27081A

LCD panels require inrush current control to prevent permanent system damages during turn-ON and turn-OFF events.

Standby Power Isolation

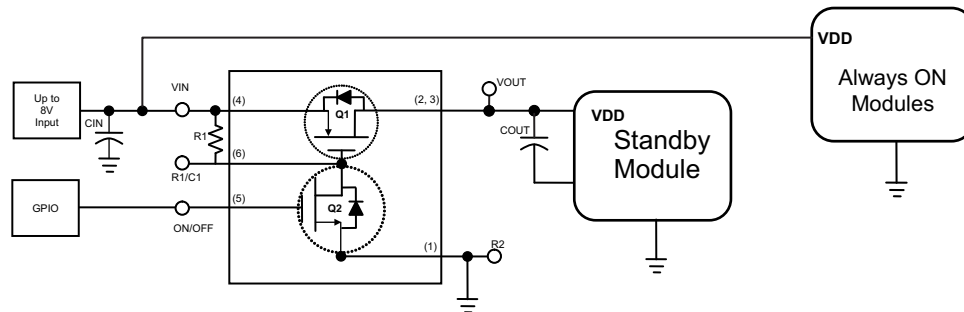


Figure 5. Standby Power Generation Using TPS27081A

Many applications have some always ON modules to support various core functions. However, some modules are selectively powered ON or OFF to save power and multiplexing of various on board resources. Such modules that are selectively turned ON or OFF require standby power generation. In such applications TPS27081A requires only a single pull-up resistor. In this configuration the VOUT voltage rise time is approximately 250ns when VIN = 5V.

Boost Regulator with True Shutdown

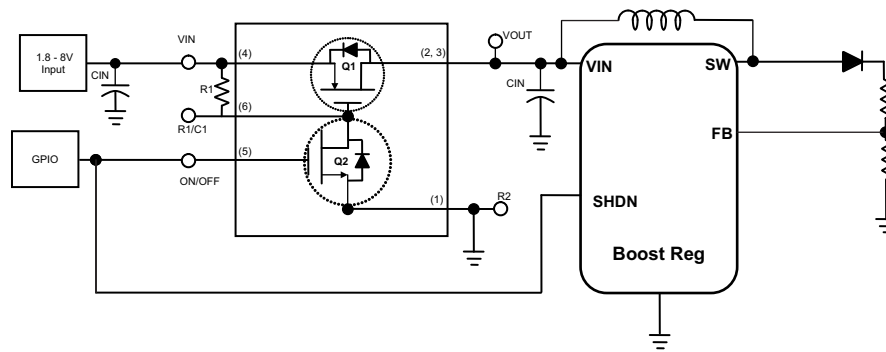


Figure 6. True Shutdown Using TPS27081A

The most common boost regulator topology provides a current leakage path through inductor and diode into the feedback resistor even when the regulator is shut down. Adding a TPS27081A in the input side power path prevents this leakage current and thus providing a true shutdown.

Single Module Multiple Power Supply Sequencing

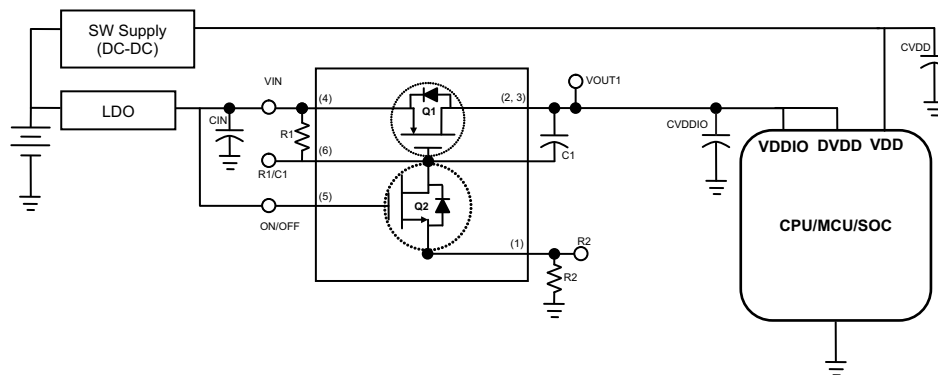


Figure 7. Power Sequencing Using TPS27081A, Example 1

Most modern SOC's and CPUs require multiple voltage inputs for its Analog, Digital cores and IO interfaces. These IC's require that these supplies be applied simultaneously or in a certain sequence. TPS27081A when configured, as shown in [Figure 7](#), with the VOUT1 rise time adjusted appropriately through resistor R2 and capacitor C1, will delay the early arriving LDO output to match up with late arriving DC-DC output and thus achieving power sequencing.

Multiple Modules Interdependent Power Supply Sequencing

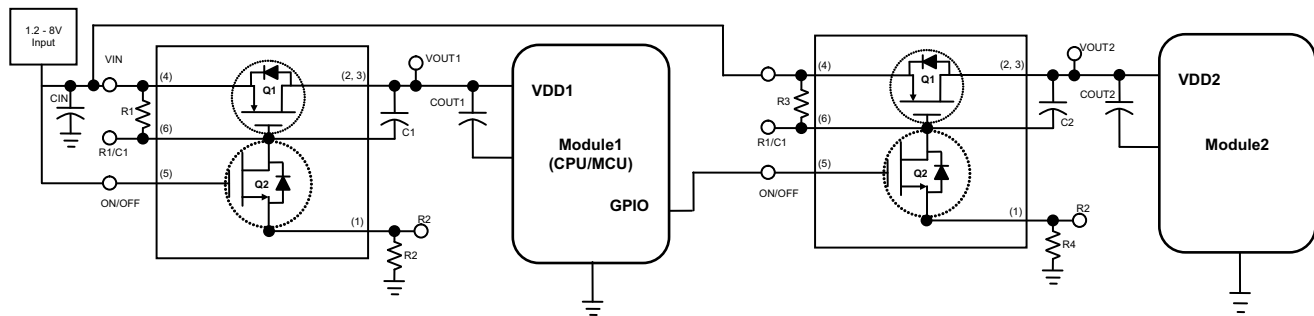


Figure 8. Power Sequencing Using TPS27081A, Example 2

For system integrity reasons a certain power sequencing may be required among various modules. As shown in [Figure 8](#), Module 2 will power up only after Module 1 is powered up and the Module 1 GPIO output is enabled to turn ON Module 2. TPS27081A when used as shown in [Figure 8](#) will not only sequence the Module 2 power, but also it will help prevent inrush current into the power path of Module 1 and 2.

Multiple Modules Interdependent Supply Sequencing without a GPIO Input

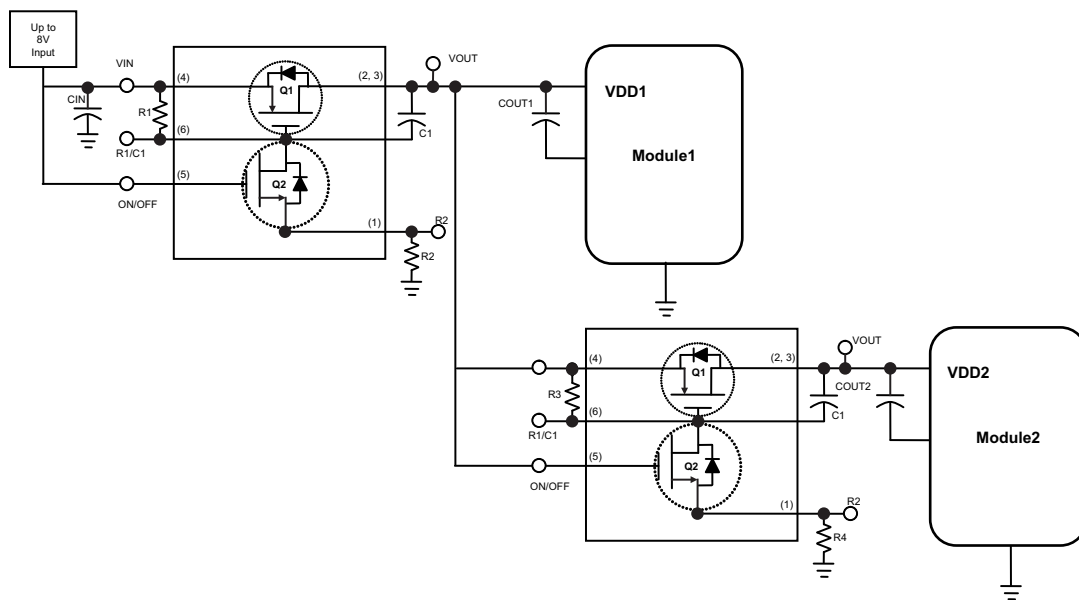
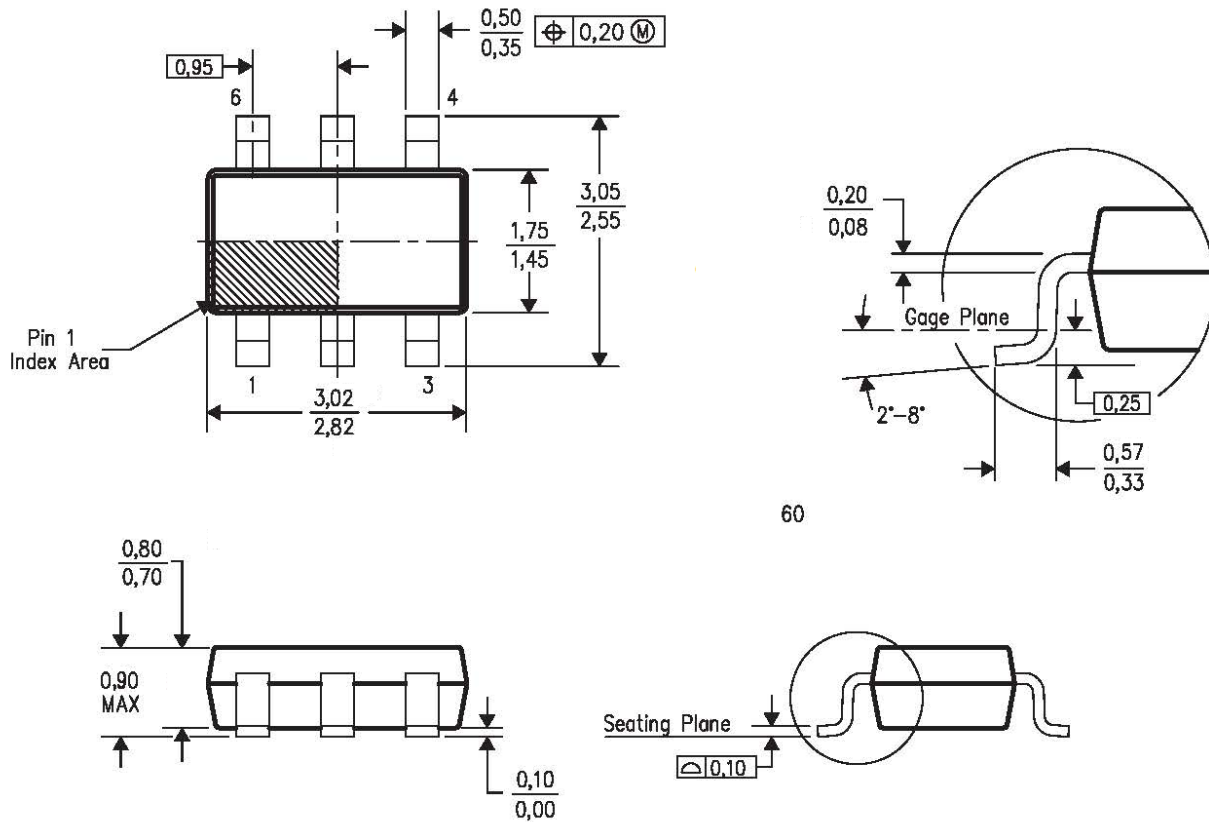


Figure 9. Power Sequencing using TPS27081A, Example 3

When a GPIO signal is not available connecting the ON/OFF pin of TPS27081 connected to Module 2 will power up Module 2 after Module 1, when resistor R4 and capacitor C1 are chosen appropriately. The two TPS27081A in this configuration will also control load inrush current.

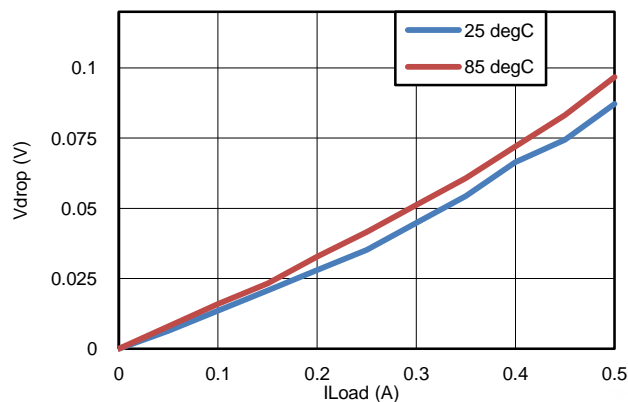
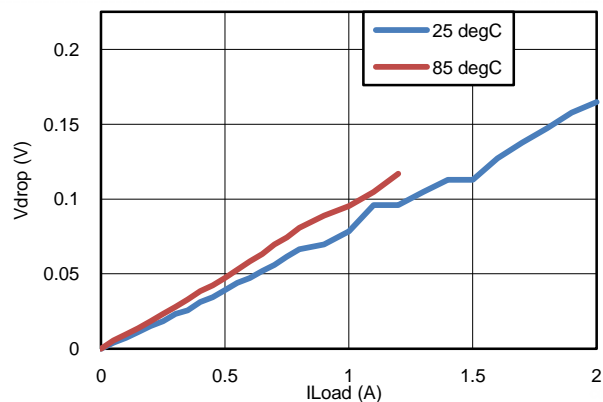
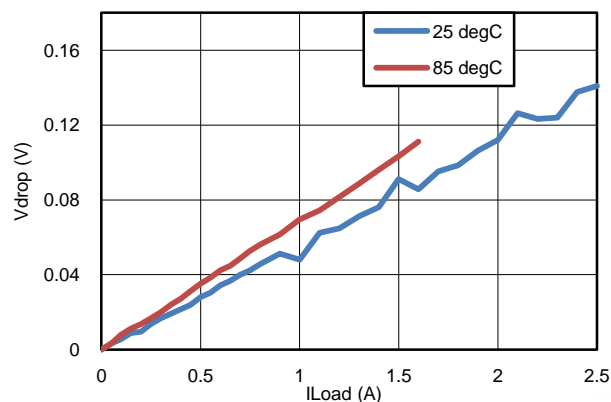
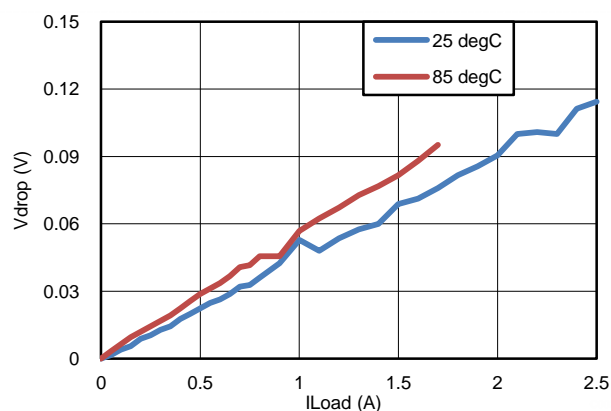
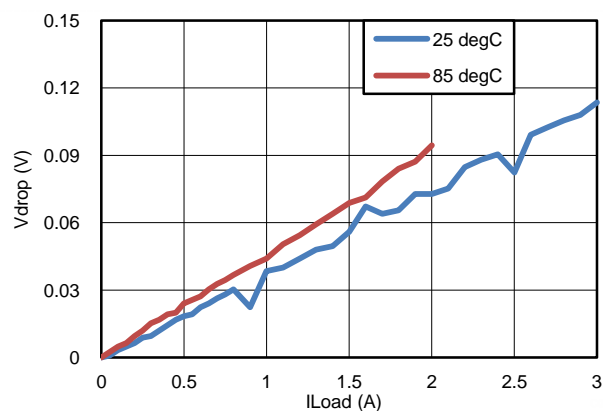
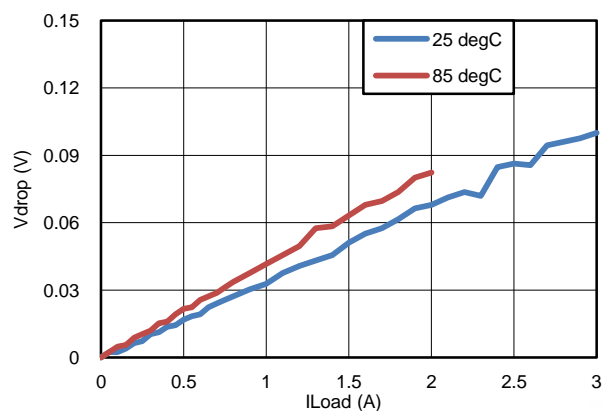
TPS27081A THIN SOT_(DDC) SPECIFIC PACKAGE DIMENSIONS



NOTES:

- All linear dimensions are in millimeters.
- Body dimensions do not include mold flash or protrusion.
- Falls within JEDEC MO-193 variation AA (6 pin).

TYPICAL CHARACTERISTICS

Figure 10. Vdrop vs IL; $V_{GS_{Q1}} = -1.2V$ Figure 11. Vdrop vs IL; $V_{GS_{Q1}} = -1.8V$ Figure 12. Vdrop vs IL; $V_{GS_{Q1}} = -2.5V$ Figure 13. Vdrop vs IL; $V_{GS_{Q1}} = -3.3V$ Figure 14. Vdrop vs IL; $V_{GS_{Q1}} = -4.5V$ Figure 15. Vdrop vs IL; $V_{GS_{Q1}} = -5.5V$

TYPICAL CHARACTERISTICS (continued)

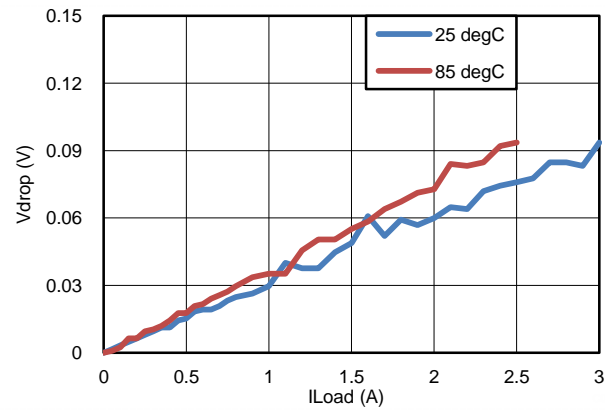


Figure 16. Vdrop vs IL; VGS_{Q1} = -7V

PFET Q1 Minimum Safe Operating Area (SOA)

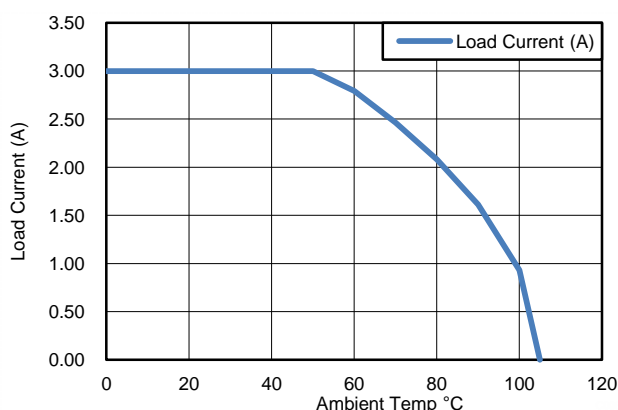


Figure 17. Q1 SOA @ VGS_Q1 = -4.5V

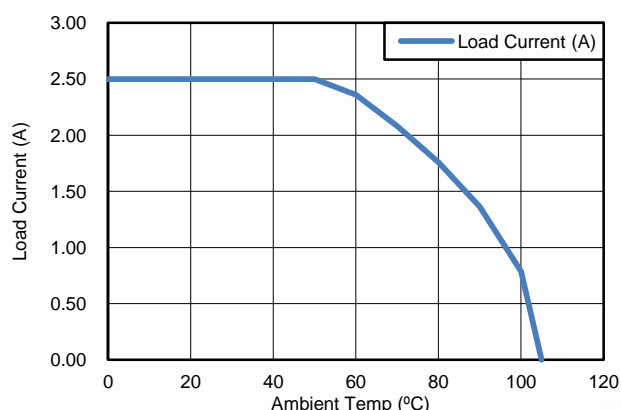


Figure 18. Q1 SOA @ VGS_Q1 = -3.0V

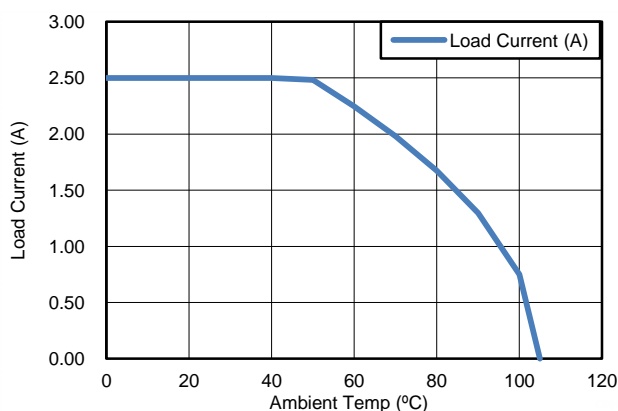


Figure 19. Q1 SOA @ VGS_Q1 = -2.5V

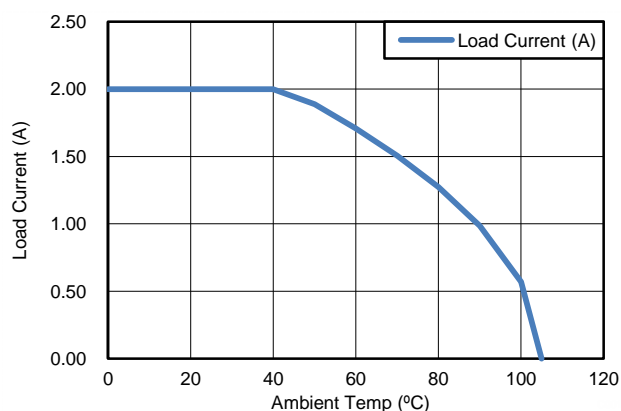


Figure 20. Q1 SOA @ VGS_Q1 = -1.8V

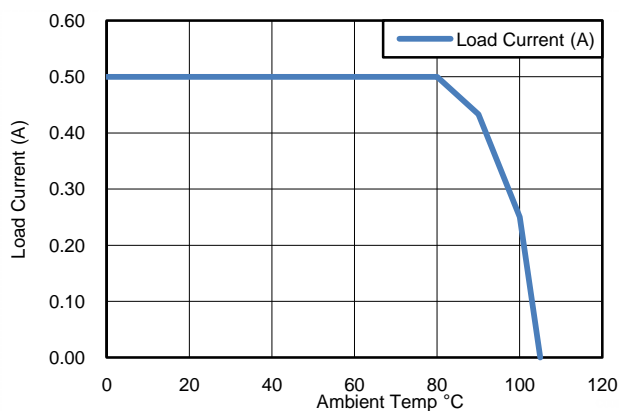


Figure 21. Q1 SOA @ VGS_Q1 = -1.2V

REVISION HISTORY

| Changes from Revision B (September 2012) to Revision C | Page |
|--|------|
|--|------|

- | | |
|--|-------------------|
| • Removed DRV package preview from datasheet. | 1 |
|--|-------------------|
-

| Changes from Revision C (January 2013) to Revision D | Page |
|--|------|
|--|------|

- | | |
|-------------------------------------|-------------------|
| • Updated wording in document. | 1 |
|-------------------------------------|-------------------|
-

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) | Op Temp (°C) | Top-Side Markings (4) | Samples |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| TPS27081ADDCR | ACTIVE | SOT | DDC | 6 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 85 | AUA | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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TAPE AND REEL INFORMATION


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TPS27081ADDCR | SOT | DDC | 6 | 3000 | 180.0 | 9.5 | 3.17 | 3.1 | 1.1 | 4.0 | 8.0 | Q3 |

TAPE AND REEL BOX DIMENSIONS

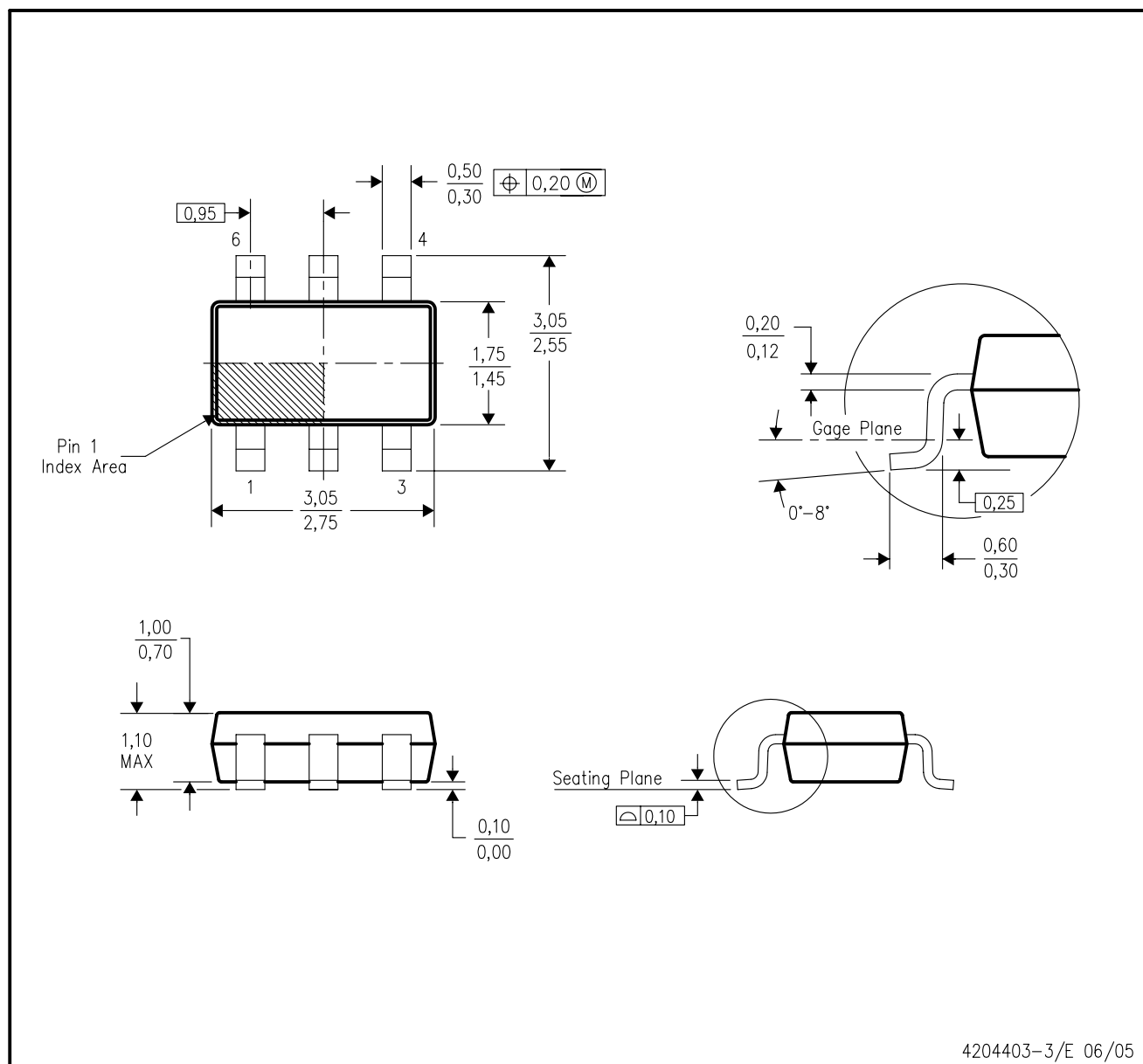


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TPS27081ADDCR | SOT | DDC | 6 | 3000 | 180.0 | 180.0 | 30.0 |

DDC (R-PDSO-G6)

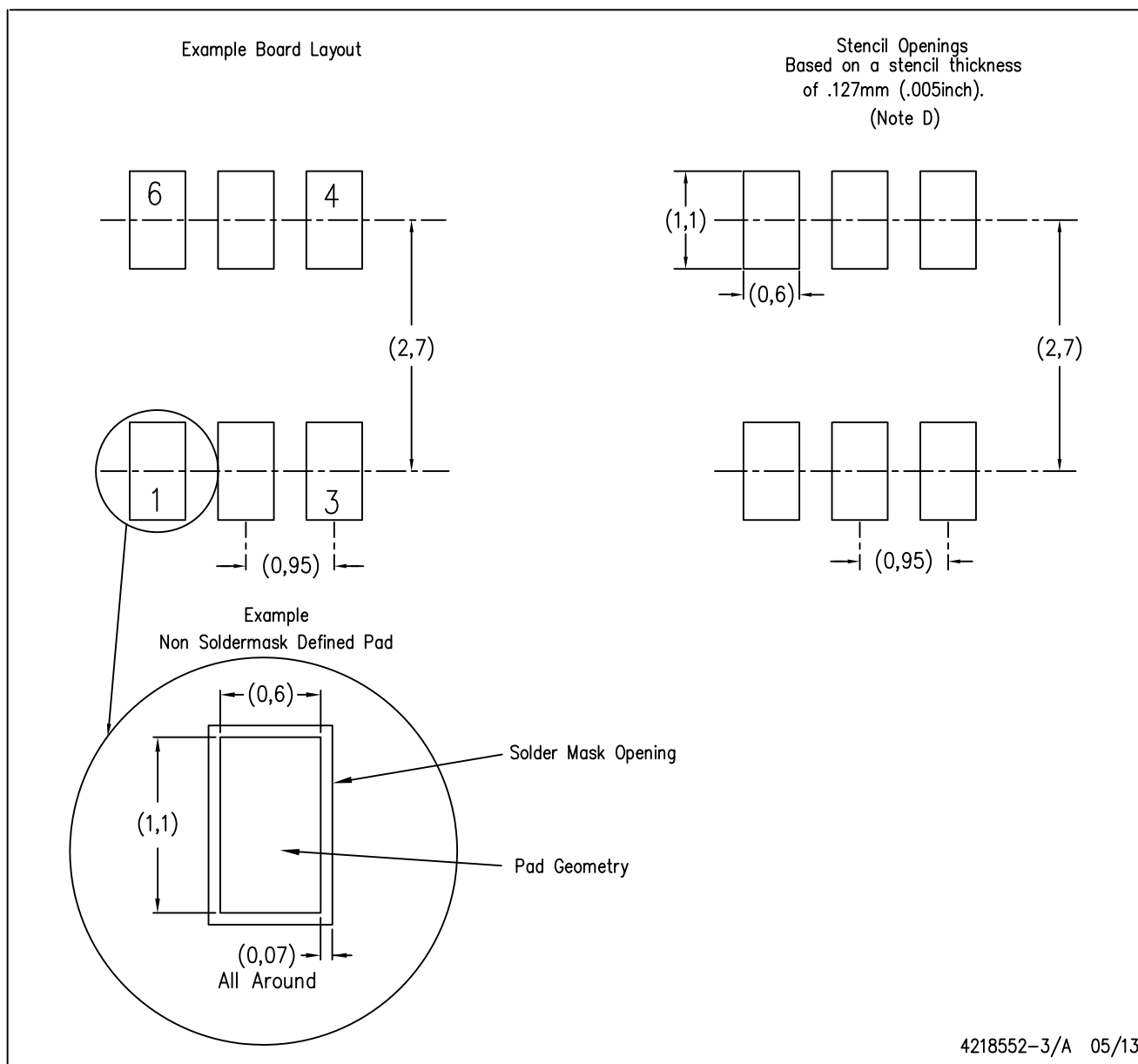
PLASTIC SMALL-OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion.
 - D. Falls within JEDEC MO-193 variation AA (6 pin).

DDC (R-PDSO-G6)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

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