

Simple Step-Up Voltage Regulator

FEATURES

- Requires Few External Components
- NPN Output Switches 3.0A, 65V(max)
- Extended Input Voltage Range: 3.0V to 40V
- Current Mode Operation for Improved Transient Response, Line Regulation, and Current Limiting
- Soft Start Function Provides Controlled Startup
- 52kHz Internal Oscillator
- Output Switch Protected by Current Limit, Undervoltage Lockout and Thermal Shutdown
- Improved Replacement for LM2577-ADJ Series

TYPICAL APPLICATIONS

- Simple Boost and Flyback Converters
- SEPIC Topology Permits Input Voltage to be Higher or Lower than Output Voltage
- Transformer Coupled Forward Regulators
- Multiple Output Designs

DESCRIPTION

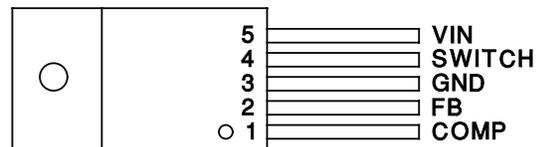
The UC2577-ADJ device provides all the active functions necessary to implement step-up (boost), flyback, and forward converter switching regulators. Requiring only a few components, these simple regulators efficiently provide up to 60V as a step-up regulator, and even higher voltages as a flyback or forward converter regulator.

The UC2577-ADJ features a wide input voltage range of 3.0V to 40V and an adjustable output voltage. An on-chip 3.0A NPN switch is included with undervoltage lockout, thermal protection circuitry, and current limiting, as well as soft start mode operation to reduce current during startup. Other features include a 52kHz fixed frequency on-chip oscillator with no external components and current mode control for better line and load regulation.

A standard series of inductors and capacitors are available from several manufacturers optimized for use with these regulators and are listed in this data sheet.

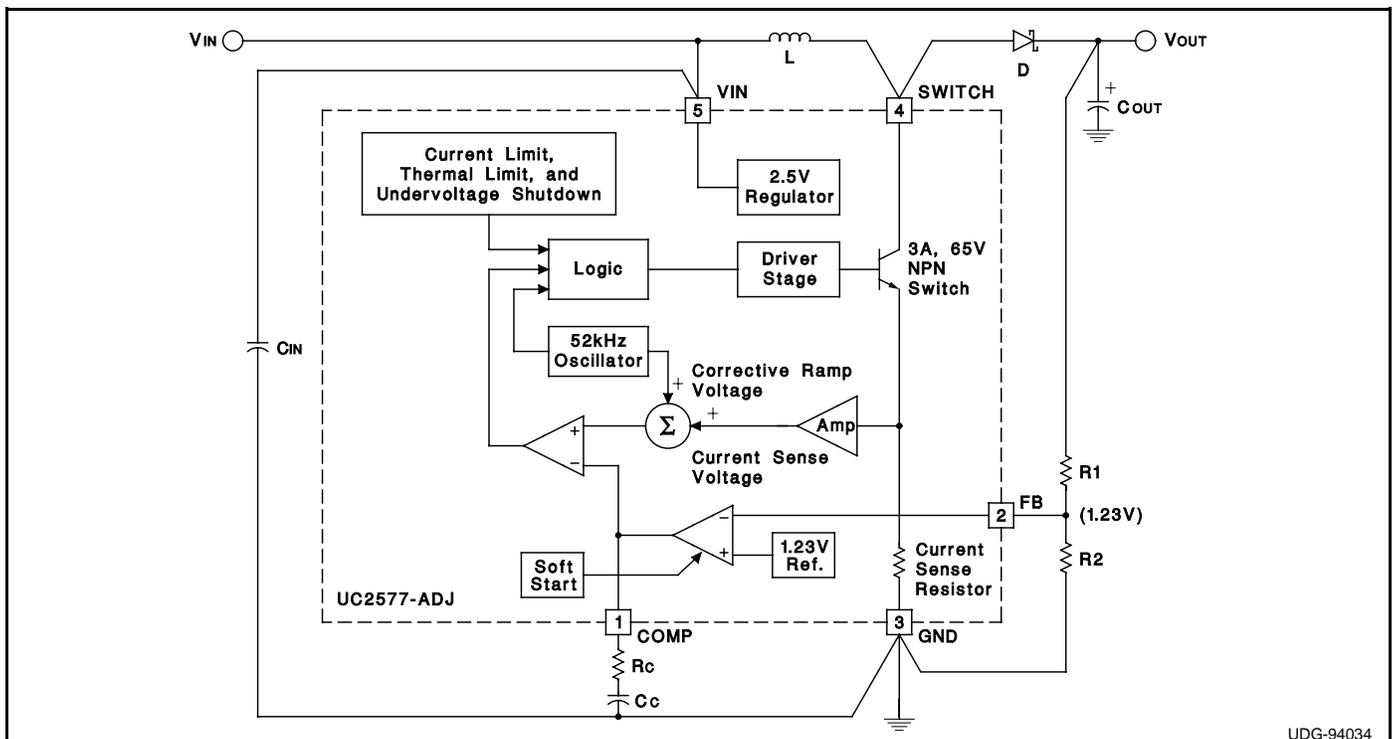
CONNECTION DIAGRAM

5-Pin TO-220 (Top View)



Also available in TO-263 Package.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Note 1)

| | |
|--|--------------------|
| Supply Voltage | 45V |
| Output Switch Voltage | 65V |
| Output Switch Current (Note 2) | 6.0A |
| Power Dissipation | Internally Limited |
| Storage Temperature Range | -65°C to +150°C |
| Lead Temperature (Soldering, 10 sec.) | 260°C |
| Maximum Junction Temperature | 150°C |
| Minimum ESD Rating (C = 100pF, R = 15kΩ) | 2kV |

RECOMMENDED OPERATING RANGE

| | |
|----------------------------|--|
| Supply Voltage | $3.0V \leq V_{IN} \leq 40V$ |
| Output Switch Voltage | $0V \leq V_{SWITCH} \leq 60V$ |
| Output Switch Current | $I_{SWITCH} \leq 3.0A$ |
| Junction Temperature Range | $-40^{\circ}C \leq T_J \leq +125^{\circ}C$ |

ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for $T_A = -40^{\circ}C$ to $+125^{\circ}C$, $V_{IN} = 5V$, $V_{FB} = V_{REF}$, $I_{SWITCH} = 0$, and $T_A = T_J$.

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|--|--|-----------|-----------|-----------|-----------|
| System Parameters Circuit Figure 1 (Note 3) | | | | | |
| Output Voltage | $V_{IN} = 5V$ to $10V$, $I_{LOAD} = 100mA$ to $800mA$ | 11.40 | 12.0 | 12.60 | V |
| | $T_J = 25^{\circ}C$ | 11.60 | | 12.40 | V |
| Line Regulation | $V_{IN} = 3.0V$ to $10V$, $I_{LOAD} = 300mA$ | | 20 | 100 | mV |
| | $T_J = 25^{\circ}C$ | | | 50 | mV |
| Load Regulation | $V_{IN} = 5V$, $I_{LOAD} = 100mA$ to $800mA$ | | 20 | 100 | mV |
| | $T_J = 25^{\circ}C$ | | | 50 | mV |
| Efficiency | $V_{IN} = 5V$, $I_{LOAD} = 800mA$ | | 80 | | % |
| Device Parameters | | | | | |
| Input Supply Current | $V_{FB} = 1.5V$ (Switch Off) | | 7.5 | 14 | mA |
| | $T_J = 25^{\circ}C$ | | | 10 | mA |
| | $I_{SWITCH} = 2.0A$, $V_{COMP} = 2.0V$ (Max Duty Cycle) | | 45 | 85 | mA |
| | $T_J = 25^{\circ}C$ | | | 70 | mA |
| Input Supply UVLO | $I_{SWITCH} = 100mA$ | | 2.70 | 2.95 | V |
| | $T_J = 25^{\circ}C$ | | | 2.85 | V |
| Oscillator Frequency | Measured at SWITCH Pin, $I_{SWITCH} = 100mA$ | 42 | 52 | 62 | kHz |
| | $T_J = 25^{\circ}C$ | 48 | | 56 | kHz |
| Reference Voltage | Measured at FB Pin, $V_{IN} = 3.0V$ to $40V$, $V_{COMP} = 1.0V$ | 1.206 | 1.230 | 1.254 | V |
| | $T_J = 25^{\circ}C$ | 1.214 | | 1.246 | V |
| Reference Voltage Line Regulation | $V_{IN} = 3.0V$ to $40V$ | | 0.5 | | mV |
| Error Amp Input Bias Current | $V_{COMP} = 1.0V$ | | 100 | 800 | nA |
| | $T_J = 25^{\circ}C$ | | | 300 | nA |
| Error Amp Transconductance | $I_{COMP} = -30\mu A$ to $+30\mu A$, $V_{COMP} = 1.0V$ | 1600 | 3700 | 5800 | μmho |
| | $T_J = 25^{\circ}C$ | 2400 | | 4800 | μmho |
| Error Amp Voltage Gain | $V_{COMP} = 0.8V$ to $1.6V$, $R_{COMP} = 1.0MW$ (Note 4) | 250 | 800 | | V/V |
| | $T_J = 25^{\circ}C$ | 500 | | | V/V |
| Error Amplifier Output Swing | Upper Limit $V_{FB} = 1.0V$ | 2.0 | 2.4 | | V |
| | $T_J = 25^{\circ}C$ | 2.2 | | | V |
| | Lower Limit $V_{FB} = 1.5V$ | | 0.3 | 0.55 | V |
| | $T_J = 25^{\circ}C$ | | | 0.40 | V |
| Error Amp Output Current | $V_{FB} = 1.0V$ to $1.5V$, $V_{COMP} = 1.0V$ | ± 90 | ± 200 | ± 400 | μA |
| | $T_J = 25^{\circ}C$ | ± 130 | | ± 300 | μA |
| Soft Start Current | $V_{FB} = 1.0V$, $V_{COMP} = 0.5V$ | 1.5 | 5.0 | 9.5 | μA |
| | $T_J = 25^{\circ}C$ | 2.5 | | 7.5 | μA |
| Maximum Duty Cycle | $V_{COMP} = 1.5V$, $I_{SWITCH} = 100mA$ | 90 | 95 | | % |
| | $T_J = 25^{\circ}C$ | 93 | | | % |

ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{IN} = 5\text{V}$, $V_{FB} = V_{REF}$, $I_{SWITCH} = 0$, and $T_A = T_J$.

| PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|----------------------------------|--|-----|------|-----|----------------------|
| Device Parameters (cont.) | | | | | |
| Switch Transconductance | | | 12.5 | | A/V |
| Switch Leakage Current | $V_{SWITCH} = 65\text{V}$, $V_{FB} = 1.5\text{V}$ (Switch Off) | | 10 | 600 | μA |
| | $T_J = 25^{\circ}\text{C}$ | | | 300 | μA |
| Switch Saturation Voltage | $I_{SWITCH} = 2.0\text{A}$, $V_{COMP} = 2.0\text{V}$ (Max Duty Cycle) | | 0.5 | 0.9 | V |
| | $T_J = 25^{\circ}\text{C}$ | | | 0.7 | V |
| NPN Switch Current Limit | $V_{COMP} = 2.0\text{V}$ | 3.0 | 4.3 | 6.0 | A |
| Thermal Resistance | Junction to Ambient | | 65 | | $^{\circ}\text{C/W}$ |
| | Junction to Case | | 2 | | $^{\circ}\text{C/W}$ |
| COMP Pin Current | $V_{COMP} = 0$ | | 25 | 50 | μA |
| | $T_J = 25^{\circ}\text{C}$ | | | 40 | μA |

- Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating ratings indicate conditions during which the device is intended to be functional, but device parameter specifications may not be guaranteed under these conditions. For guaranteed specifications and test conditions, see the Electrical Characteristics.
- Note 2: Output current cannot be internally limited when the UC2577 is used as a step-up regulator. To prevent damage to the switch, its current must be externally limited to 6.0A. However, output current is internally limited when the UC2577 is used as a flyback or forward converter regulator.
- Note 3: External components such as the diode, inductor, input and output capacitors can affect switching regulator performance. When the UC2577 is used as shown in the Test Circuit, system performance will be as specified by the system parameters.
- Note 4: A $1.0\text{M}\Omega$ resistor is connected to the compensation pin (which is the error amplifier's output) to ensure accuracy in measuring A_{VOL} . In actual applications, this pin's load resistance should be $\geq 10\text{M}\Omega$, resulting in A_{VOL} that is typically twice the guaranteed minimum limit.

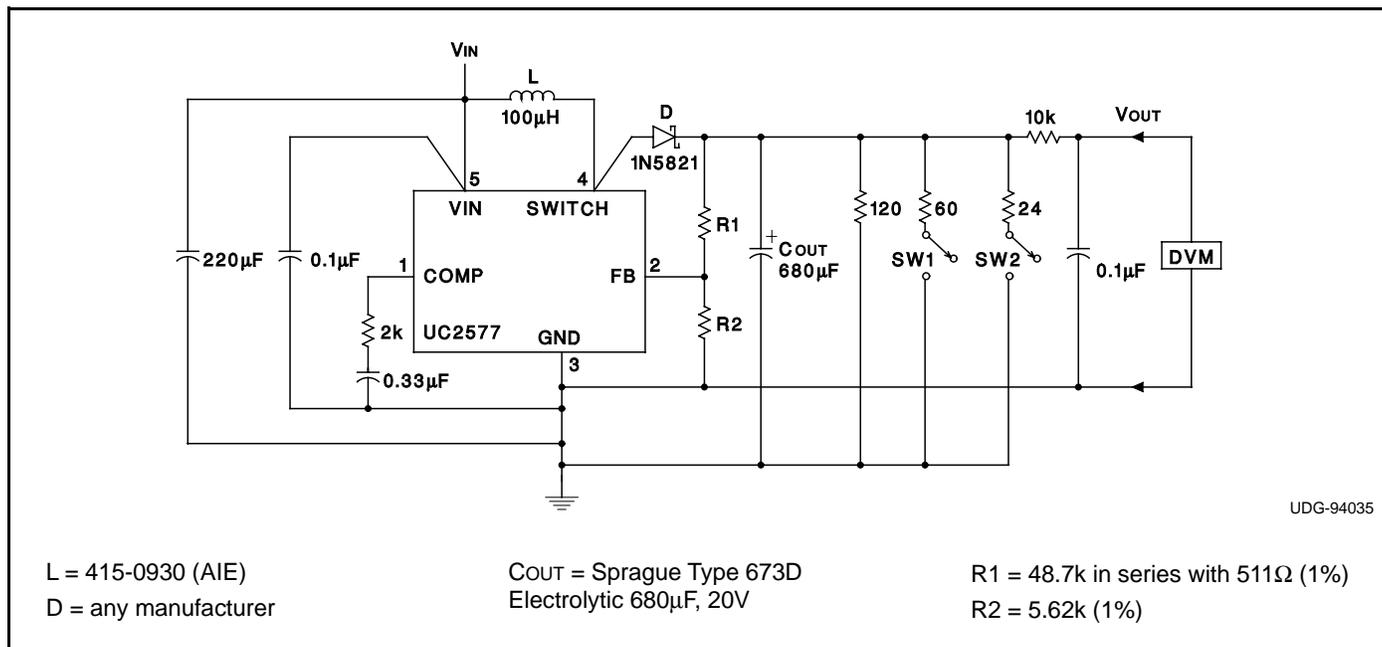


Figure 1. Circuit Used to Specify System Parameters

APPLICATIONS INFORMATION

Step-up (Boost) Regulator

The Block Diagram shows a step-up switching regulator utilizing the UC2577. The regulator produces an output voltage higher than the input voltage. The UC2577 turns its switch on and off at a fixed frequency of 52kHz, thus storing energy in the inductor (L). When the NPN switch is on, the inductor current is charged at a rate of VIN/L. When the switch is off, the voltage at the SWITCH terminal of the inductor rises above VIN, discharging the stored current through the output diode (D) into the output capacitor (COUT) at a rate of (VOUT - VIN)/L. The energy stored in the inductor is thus transferred to the output.

The output voltage is controlled by the amount of energy transferred, which is controlled by modulating the peak inductor current. This modulation is accomplished by feeding a portion of the output voltage to an error amplifier which amplifies the difference between the feedback voltage and an internal 1.23V precision reference voltage. The output of the error amplifier is then compared to a voltage proportional to the switch current, or the inductor current, during the switch on time. A comparator terminates the switch on time when the two voltages are equal and thus controls the peak switch current to maintain a constant output voltage. Figure 2 shows voltage and current waveforms for the circuit. Formulas for calculation are shown in Figure 3.

STEP-UP REGULATOR DESIGN PROCEDURE

Refer to the Block Diagram

Given:

VINmin = Minimum input supply voltage

VOUT = Regulated output voltage

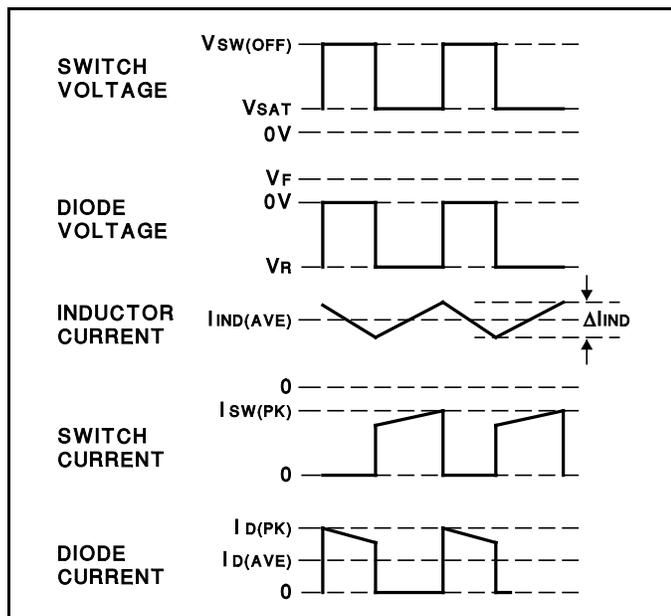


Figure 2. Step-up Regulator Waveforms

| | | |
|-------------------------|-----------|---|
| Duty Cycle | D | $\frac{V_{OUT} + V_F - V_{IN}}{V_{OUT} + V_F - V_{SAT}} \approx \frac{V_{OUT} - V_{IN}}{V_{OUT}}$ |
| Avg. Inductor Current | IIND(AVG) | $\frac{I_{LOAD}}{1 - D}$ |
| Inductor Current Ripple | ΔIIND | $\frac{V_{IN} - V_{SAT}}{L} \cdot \frac{D}{52,000}$ |
| Peak Inductor Current | IIND(PK) | $\frac{I_{LOAD}}{1 - D} + \frac{\Delta I_{IND}}{2}$ |
| Peak Switch Current | ISW(PK) | $\frac{I_{LOAD}}{1 - D} + \frac{\Delta I_{IND}}{2}$ |
| Switch Voltage when Off | VSW(OFF) | VOUT + VF |
| Diode Reverse Voltage | VR | VOUT - VSAT |
| Avg. Diode Current | ID(AVG) | ILOAD |
| Peak Diode Current | ID(PK) | $\frac{I_{LOAD}}{1 - D} + \frac{\Delta I_{IND}}{2}$ |
| Power Dissipation | PD | $0.25\Omega \left(\frac{I_{LOAD}}{1 - D}\right)^2 D + \frac{I_{LOAD} \cdot D \cdot V_{IN}}{50 (1 - D)}$ |

VF = Forward Biased Diode Voltage, ILOAD = Output Load

Figure 3. Step-up Regulator Formulas

First, determine if the UC2577 can provide these values of VOUT and ILOADmax when operating with the minimum value of VIN. The upper limits for VOUT and ILOADmax are given by the following equations.

$$V_{OUT} \leq 60V \text{ and}$$

$$V_{OUT} \leq 10 \cdot V_{INmin}$$

$$I_{LOADmax} \leq \frac{2.1A \cdot V_{INmin}}{V_{OUT}}$$

These limits must be greater than or equal to the values specified in this application.

1. Output Voltage Section

Resistors R1 and R2 are used to select the desired output voltage. These resistors form a voltage divider and present a portion of the output voltage to the error amplifier which compares it to an internal 1.23V reference. Select R1 and R2 such that:

$$\frac{R1}{R2} = \frac{V_{OUT}}{1.23V} - 1$$

APPLICATIONS INFORMATION (cont.)

2. Inductor Selection (L)

A. Preliminary Calculations

To select the inductor, the calculation of the following three parameters is necessary:

D_{max} , the maximum switch duty cycle ($0 \leq D \leq 0.9$):

$$D_{max} = \frac{V_{OUT} + V_F - V_{INmin}}{V_{OUT} + V_F - 0.6V}$$

where typically $V_F = 0.5V$ for Schottky diodes and $V_F = 0.8V$ for fast recovery diodes.

$E \cdot T$, the product of volts \cdot time that charges the inductor:

$$E \cdot T = \frac{D_{max} \cdot (V_{INmin} - 0.6V) 10^6}{52,000\text{Hz}} \text{ (V} \cdot \mu\text{s)}$$

$I_{IND, DC}$, the average inductor current under full load:

$$I_{IND, DC} = \frac{1.05 \cdot I_{LOADmax}}{1 - D_{max}}$$

B. Identify Inductor Value:

1. From Figure 4, identify the inductor code for the region indicated by the intersection of $E \cdot T$ and $I_{IND, DC}$. This code gives the inductor value in microhenries. The L or H prefix signifies whether the inductor is rated for a maximum $E \cdot T$ of $90V\mu s$ (L) or $250V\mu s$ (H).

2. If $D < 0.85$, go to step C. If $D \geq 0.85$, calculate the minimum inductance needed to ensure the switching regulator's stability:

If L_{min} is smaller than the inductor values found in step B1, go on to step C. Otherwise, the inductor value found in step B1 is too low; an appropriate inductor code should be obtained from the graph as follows:

1. Find the lowest value inductor that is greater than L_{min} .
2. Find where $E \cdot T$ intersects this inductor value to determine if it has an L or H prefix. If $E \cdot T$ intersects both the L and H regions, select the inductor with an H prefix.

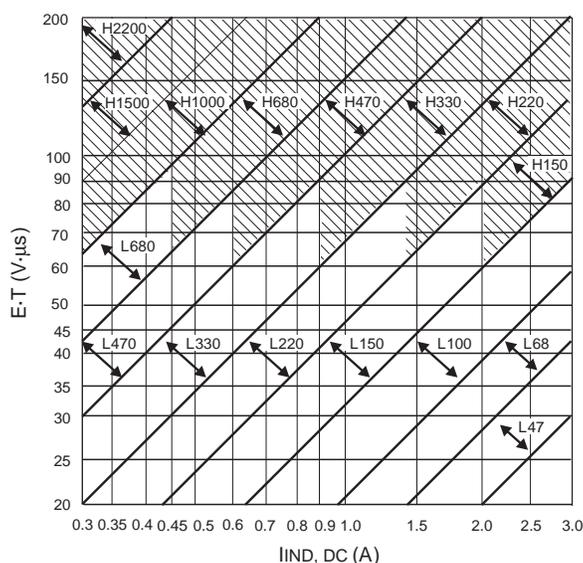
C. Inductor Selection

Select an inductor from the table of Figure 5 which cross references the inductor codes to the part numbers of the three different manufacturers. The inductors listed in this table have the following characteristics:

A/E (ferrite, pot-core inductors): Benefits of this type are low electromagnetic interference (EMI), small physical size, and very low power dissipation (core loss).

Pulse (powdered iron, toroid core inductors): Benefits are low EMI and ability to withstand $E \cdot T$ and peak current above rated value better than ferrite cores.

Renco (ferrite, bobbin-core inductors): Benefits are low cost and best ability to withstand $E \cdot T$ and peak current above rated value. Be aware that these inductors generate more EMI than the other types, and this may interfere with signals sensitive to noise.



Note: This chart assumes that the inductor ripple current is approximately 20% to 30% of the average inductor current (when the regulator is under full load). Greater ripple current causes higher peak switch currents and greater output ripple voltage. Lower ripple current is achieved with larger value inductors. The factor of 20% to 30% is chosen as a convenient balance between the two extremes.

Figure 4. Inductor Selection Graph

APPLICATIONS INFORMATION (cont.)

| Inductor Code | Manufacturer's Part Number | | |
|---------------|----------------------------|------------|--------|
| | AIE | Pulse | Renco |
| L47 | 415 - 0932 | PE - 53112 | RL2442 |
| L68 | 415 - 0931 | PE - 92114 | RL2443 |
| L100 | 415 - 0930 | PE - 92108 | RL2444 |
| L150 | 415 - 0953 | PE - 53113 | RL1954 |
| L220 | 415 - 0922 | PE - 52626 | RL1953 |
| L330 | 415 - 0926 | PE - 52627 | RL1952 |
| L470 | 415 - 0927 | PE - 53114 | RL1951 |
| L680 | 415 - 0928 | PE - 52629 | RL1950 |
| H150 | 415 - 0936 | PE - 53115 | RL2445 |
| H220 | 430 - 0636 | PE - 53116 | RL2446 |
| H330 | 430 - 0635 | PE - 53117 | RL2447 |
| H470 | 430 - 0634 | PE - 53118 | RL1961 |
| H680 | 415 - 0935 | PE - 53119 | RL1960 |
| H1000 | 415 - 0934 | PE - 53120 | RL1959 |
| H1500 | 415 - 0933 | PE - 53121 | RL1958 |
| H2200 | 415 - 0945 | PE - 53122 | RL2448 |

AIE Magnetics, Div. Vernitron Corp., (813)347-2181
2801 72nd Street North, St. Petersburg, FL 33710

Pulse Engineering, (619)674-8100
12220 World Trade Drive, San Diego, CA 92128

Renco Electronics, Inc., (516)586-5566
60 Jeffryn Blvd. East, Deer Park, NY 11729

Figure 5. Table of Standardized Inductors and Manufacturer's Part Numbers

3. Compensation Network (R_C, C_C) and Output Capacitor (C_{OUT}) Selection

The compensation network consists of resistor R_C and capacitor C_C which form a simple pole-zero network and stabilize the regulator. The values of R_C and C_C depend upon the voltage gain of the regulator, I_{LOADmax}, the inductor L, and output capacitance C_{OUT}. A procedure to calculate and select the values for R_C, C_C, and C_{OUT} which ensures stability is described below. It should be noted, however, that this may not result in optimum compensation. To guarantee optimum compensation a standard procedure for testing loop stability is recommended, such as measuring V_{OUT} transient responses to pulsing I_{LOAD}.

A. Calculate the maximum value for R_C.

$$R_C \leq \frac{750 \cdot I_{LOADmax} \cdot V_{OUT}^2}{V_{INmin}^2}$$

Select a resistor less than or equal to this value, not to exceed 3kΩ.

B. Calculate the minimum value for C_{OUT} using the following two equations.

$$C_{OUT} \geq \frac{0.19 \cdot L \cdot R_C \cdot I_{LOADmax}}{V_{INmin} \cdot V_{OUT}} \text{ and}$$

$$C_{OUT} \geq \frac{V_{INmin} \cdot R_C \cdot (V_{INmin} + (3.74 \cdot 10^5 \cdot L))}{487,800 \cdot V_{OUT}^3}$$

The larger of these two values is the minimum value that ensures stability.

C. Calculate the minimum value of C_C.

$$C_C \geq \frac{58.5 \cdot V_{OUT}^2 \cdot C_{OUT}}{R_C^2 \cdot V_{INmin}}$$

The compensation capacitor is also used in the soft start function of the regulator. When the input voltage is applied to the part, the switch duty cycle is increased slowly at a rate defined by the compensation capacitor and the soft start current, thus eliminating high input currents. Without the soft start circuitry, the switch duty cycle would instantly rise to about 90% and draw large currents from the input supply. For proper soft starting, the value for C_C should be equal or greater than 0.22μF.

Figure 6 lists several types of aluminum electrolytic capacitors which could be used for the output filter. Use the following parameters to select the capacitor.

Working Voltage (WVDC): Choose a capacitor with a working voltage at least 20% higher than the regulator output voltage.

Ripple Current: This is the maximum RMS value of current that charges the capacitor during each switching cycle. For step-up and flyback regulators, the formula for ripple current is:

$$I_{RIPPLErms} = \frac{I_{LOADmax} \cdot D_{max}}{1 - D_{max}}$$

Choose a capacitor that is rated at least 50% higher than this value at 52kHz.

Equivalent Series Resistance (ESR): This is the primary cause of output ripple voltage, and it also affects the values of R_C and C_C needed to stabilize the regulator. As a result, the preceding calculations for C_C and R_C are only valid if the ESR does not exceed the maximum value specified by the following equations.

$$ESR \leq \frac{0.01 \cdot 15V}{I_{RIPPLE(P-P)}} \text{ and } \leq \frac{8.7 \cdot 10^{-3} \cdot V_{IN}}{I_{LOADmax}} \text{ where}$$

$$I_{RIPPLE(P-P)} = \frac{1.15 \cdot I_{LOADmax}}{1 - D_{max}}$$

Select a capacitor with an ESR, at 52kHz, that is less than or equal to the lower value calculated. Most electrolytic capacitors specify ESR at 120kHz which is 15% to 30% higher than at 52kHz. Also, note that ESR increases by a factor of 2 when operating at -20°C.

In general, low values of ESR are achieved by using large value capacitors (C ≥ 470μF), and capacitors with high WVDC, or by paralleling smaller value capacitors.

APPLICATIONS INFORMATION (cont.)

4. Input Capacitor Selection (C_{IN})

To reduce noise on the supply voltage caused by the switching action of a step-up regulator (ripple current noise), V_{IN} should be bypassed to ground. A good quality 0.1 μ F capacitor with low ESR should provide sufficient decoupling. If the UC2577 is located far from the supply source filter capacitors, an additional electrolytic (47 μ F, for example) is required.

Nichicon - Types PF, PX, or PZ
927 East State Parkway, Schaumburg, IL 60173
(708)843-7500

United Chemi-CON - Types LX, SXF, or SXJ
9801 West Higgins, Rosemont, IL 60018
(708)696-2000

Figure 6. Aluminum Electrolytic Capacitors Recommended for Switching Regulators

5. Output Diode Selection (D)

In the step-up regulator, the switching diode must withstand a reverse voltage and be able to conduct the peak output current of the UC2577. Therefore a suitable diode must have a minimum reverse breakdown voltage greater than the circuit output voltage, and should also be rated for average and peak current greater than I_{LOADmax} and I_{Dpk}. Because of their low forward voltage drop (and thus higher regulator efficiencies), Schottky barrier diodes are often used in switching regulators. Refer to Figure 7 for recommended part numbers and voltage ratings of 1A and 3A diodes.

| V _{OUTmax} | Schottky | | Fast Recovery | |
|---------------------|-----------------------------|-----------------------------|---------------------------|-------------------------|
| | 1A | 3A | 1A | 3A |
| 20V | 1N5817 MBR120P | 1N5820 MBR320P | | |
| 30V | 1N5818 MBR130P 11DQ03 | 1N5821 MBR330P 31DQ03 | | |
| 40V | 1N5819 MBR140P 11DQ04 | 1N5822 MBR340P 31DQ04 | | |
| 50V | MBR150 11DQ05 | MBR350 31DQ05 | 1N4933 MUR105 | |
| 100V | | | 1N4934 MUR110 10DL1 | MR851 30DL1 MR831 |

MBRxxx and MURxxx are manufactured by Motorola.
1DDxxx, 11Cxx and 31Dxx are manufactured by
International Rectifier

Figure 7. Diode Selection Chart

ORDERING INFORMATION

Unitrode Type Number

UC2577TKC-ADJ 5 Pin TO-220 Plastic Pkg -50 pc Tube

UC2577TDKTTT-ADJ 5 Pin TO-263 Plastic Pkg -50 pc Reel

UC2577TDTR-ADJ 5 Pin TO-263 Plastic Pkg -500 pc Reel

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) | Device Marking (4/5) | Samples |
|--------------------|---------------|------------------|-----------------|------|-------------|-------------------------|------------------|----------------------|--------------|-------------------------|-------------------------|
| UC2577T-ADJ | ACTIVE | TO-220 | KC | 5 | 50 | Green (RoHS & no Sb/Br) | CU SN | N / A for Pkg Type | -40 to 125 | UC2577T-ADJ | Samples |
| UC2577T-ADJG3 | ACTIVE | TO-220 | KC | 5 | 50 | Green (RoHS & no Sb/Br) | CU SN | N / A for Pkg Type | -40 to 125 | UC2577T-ADJ | Samples |
| UC2577TD-ADJ | OBSOLETE | DDPAK/ TO-263 | KTT | 5 | | TBD | Call TI | Call TI | -40 to 125 | | |
| UC2577TDKTTT-ADJ | ACTIVE | DDPAK/ TO-263 | KTT | 5 | 50 | Green (RoHS & no Sb/Br) | CU SN | Level-2-260C-1 YEAR | -40 to 125 | UC2577TD-ADJ | Samples |
| UC2577TDKTTT-ADJG3 | ACTIVE | DDPAK/ TO-263 | KTT | 5 | 50 | Green (RoHS & no Sb/Br) | CU SN | Level-2-260C-1 YEAR | -40 to 125 | UC2577TD-ADJ | Samples |
| UC2577TDTR-ADJG3 | ACTIVE | DDPAK/ TO-263 | KTT | 5 | | TBD | Call TI | Call TI | -40 to 125 | UC2577TD-ADJ | 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) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device 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 Device Marking for that device.

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TAPE AND REEL INFORMATION



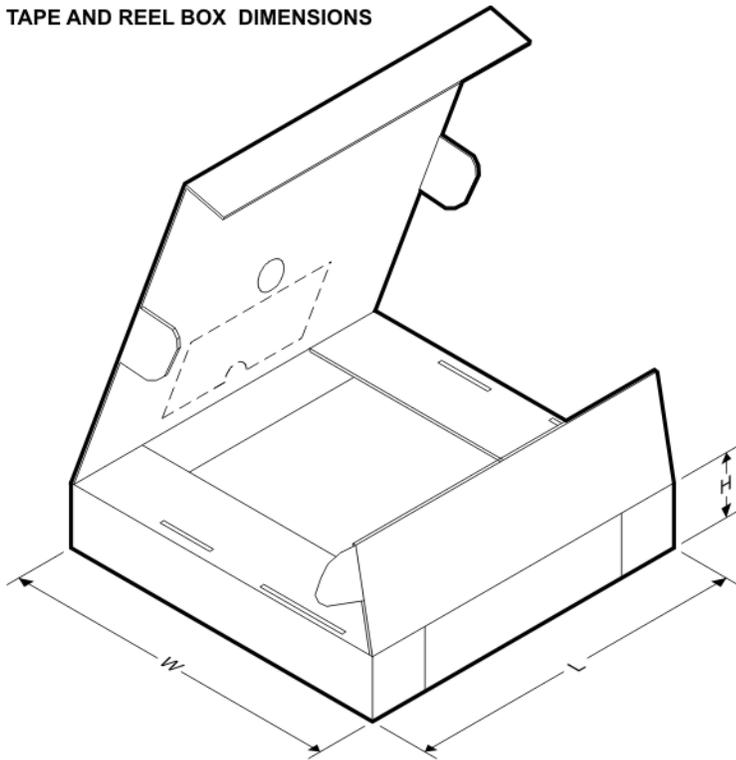
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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 |
|------------------|------------------|-----------------|------|-----|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| UC2577TDKTTT-ADJ | DDPAK/ TO-263 | KTT | 5 | 50 | 330.0 | 24.4 | 10.6 | 15.6 | 4.9 | 16.0 | 24.0 | Q2 |

TAPE AND REEL BOX DIMENSIONS

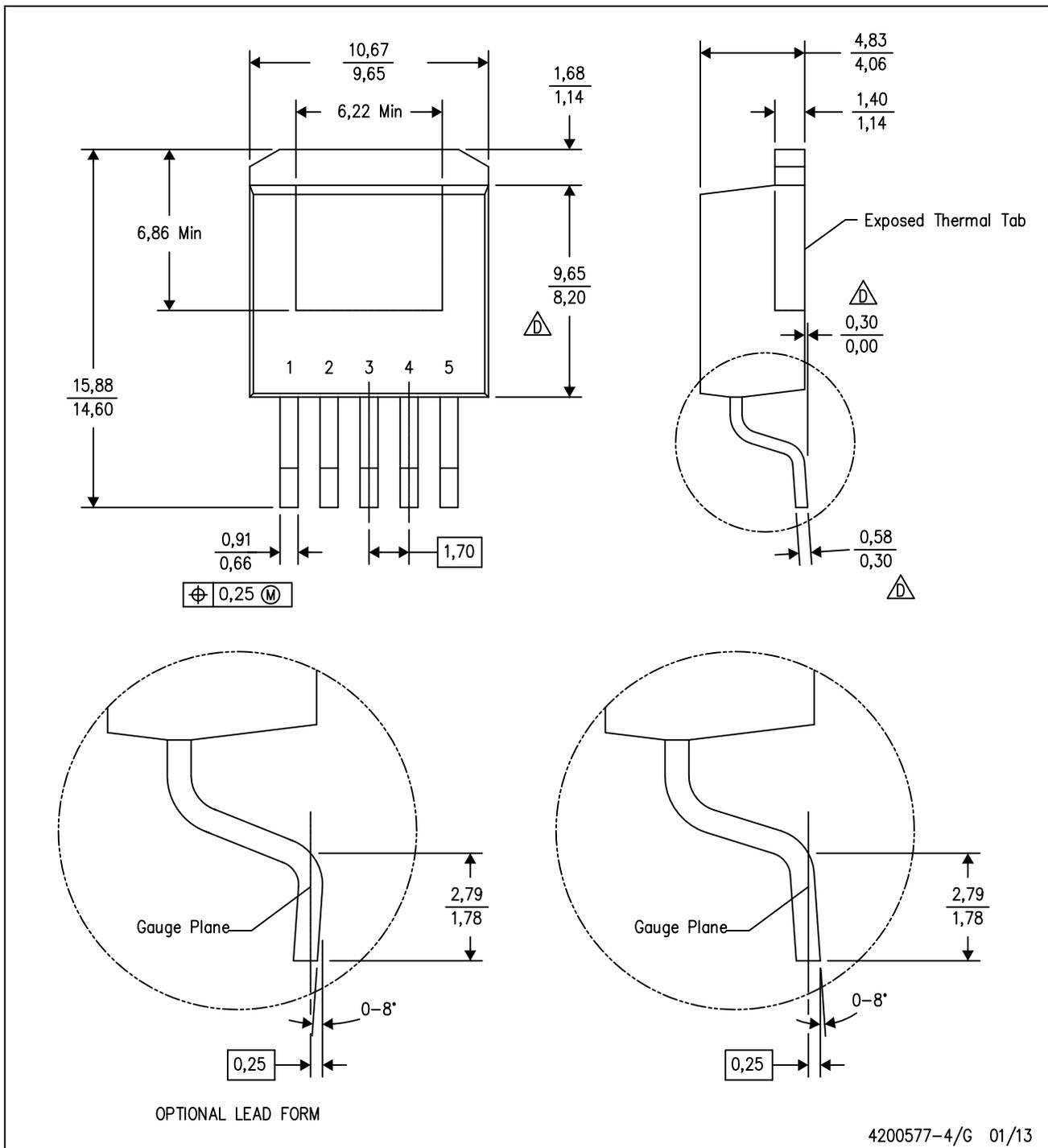


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|-----|-------------|------------|-------------|
| UC2577TDKTTT-ADJ | DDPAK/TO-263 | KTT | 5 | 50 | 367.0 | 367.0 | 45.0 |

KTT (R-PSFM-G5)

PLASTIC FLANGE-MOUNT PACKAGE

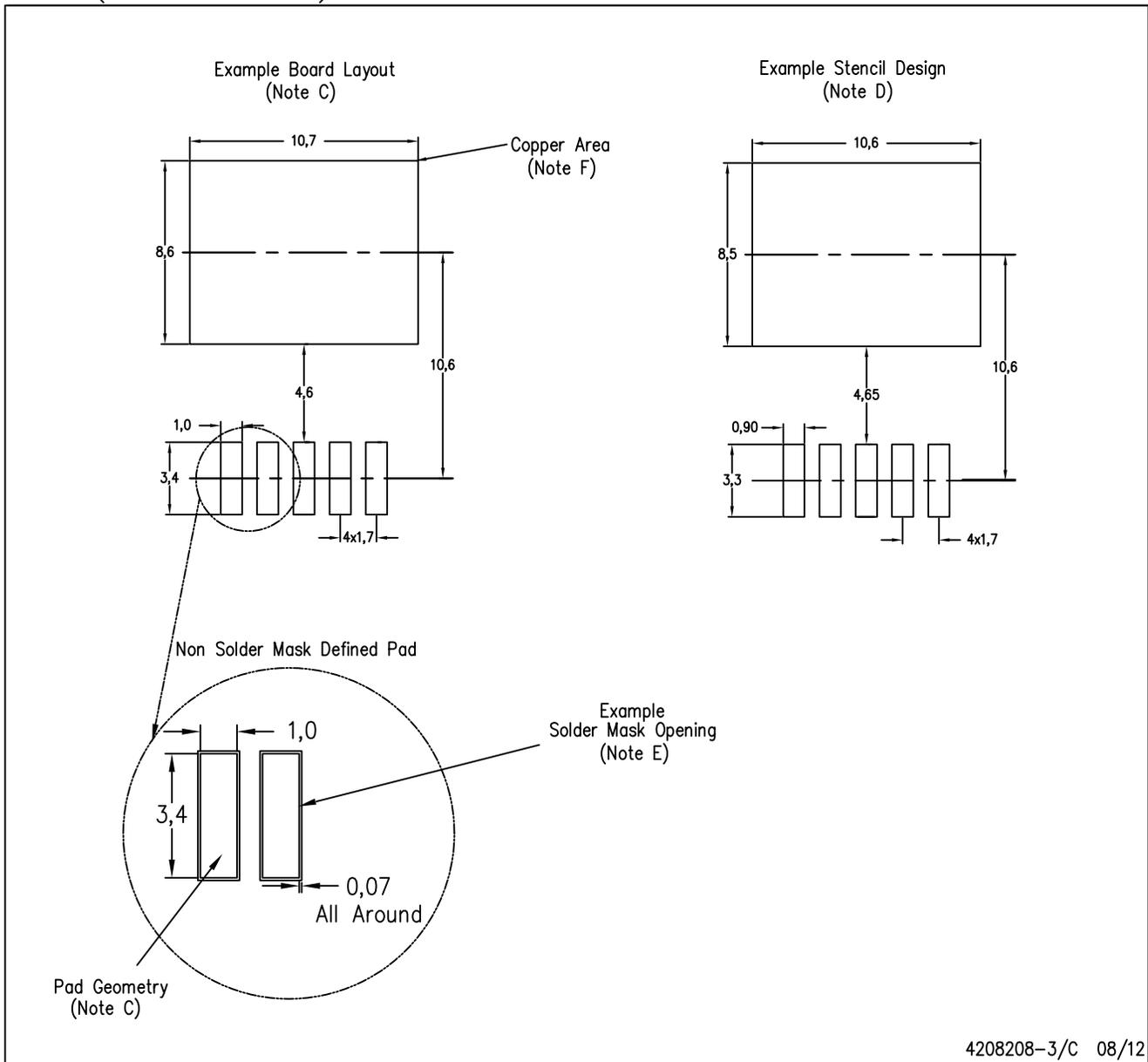


4200577-4/G 01/13

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion. Mold flash or protrusion not to exceed 0.005 (0,13) per side.
- Δ Falls within JEDEC TO-263 variation BA, except minimum lead thickness, maximum seating height, and minimum body length.

KTT (R-PSFM-G5)

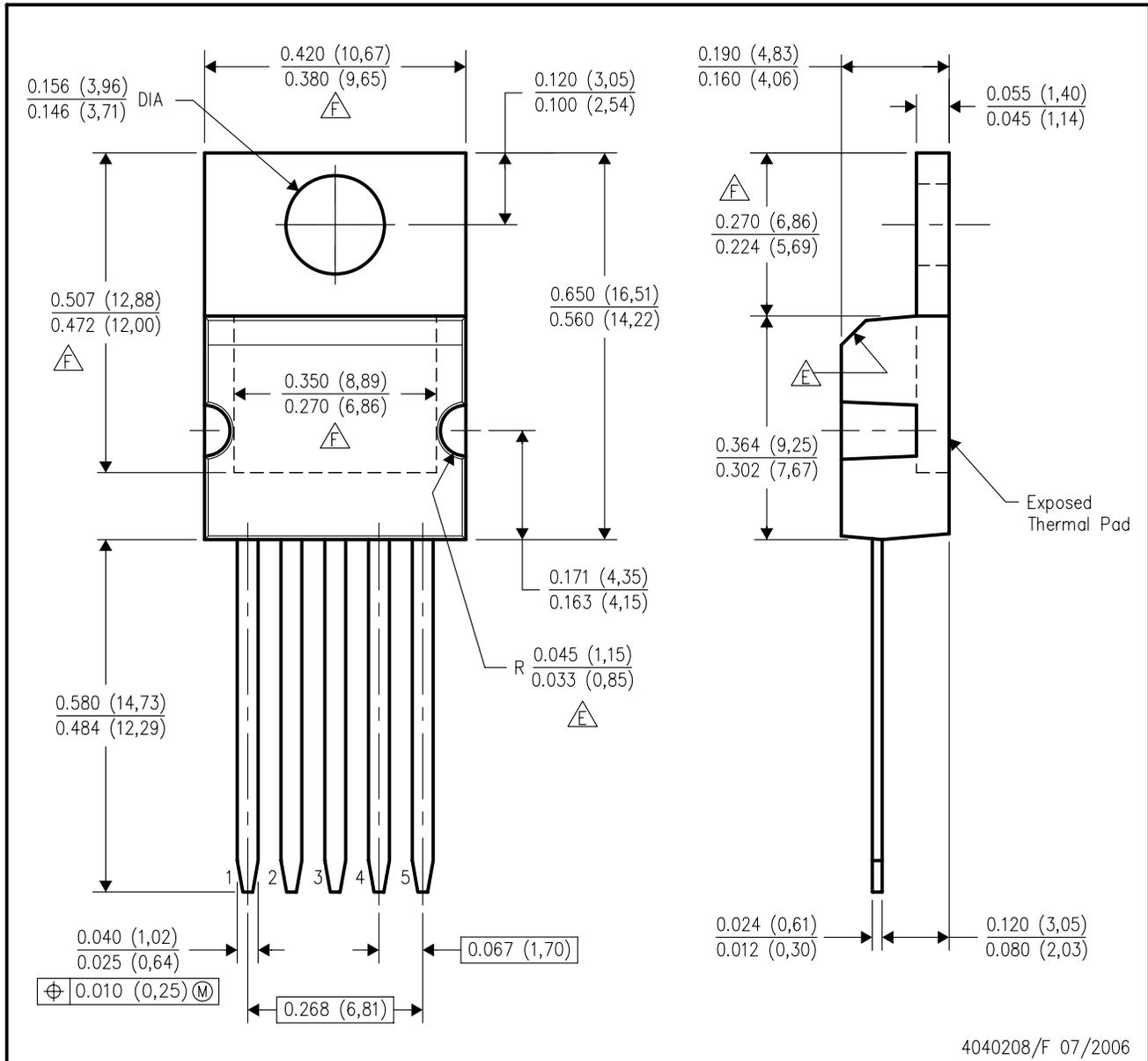
PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-SM-782 is recommended for alternate designs.
 - 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. Refer to IPC-7525.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.
 - This package is designed to be soldered to a thermal pad on the board. Refer to the Product Datasheet for specific thermal information, via requirements, and recommended thermal pad size. For thermal pad sizes larger than shown a solder mask defined pad is recommended in order to maintain the solderable pad geometry while increasing copper area.

KC (R-PSFM-T5)

PLASTIC FLANGE-MOUNT PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - All lead dimensions apply before solder dip.
 - The center lead is in electrical contact with the mounting tab.
- △ These features are optional.
- △ Thermal pad contour optional within these dimensions.

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