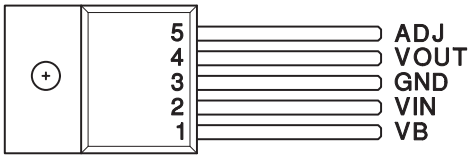
UC282-1, UC282-2, UC282-3, UC282-ADJ, UC382-1, UC382-2, UC382-3, UC382-ADJ
FAST LDO LINEAR REGULATOR

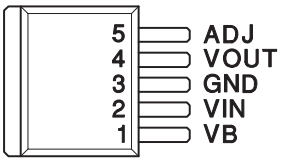
SLUS317B − JANUARY 2000 − REVISED FEBRUARY 2004

- **Fast Transient Response**
- **10-mA to 3-A Load Current**
- **Short Circuit Protection**
- **Maximum Dropout of 450-mV at 3-A Load Current**
- **Separate Bias and VIN Pins**
- **Available in Adjustable or Fixed-Output Voltages**
- **5-Pin Package Allows Kelvin Sensing of Load Voltage**
- **Reverse Current Protection**

5-PIN TO-220
T PACKAGE (TOP VIEW)



5-PIN TO-263
TD PACKAGE
(TOP VIEW)



Note: Tab = Ground

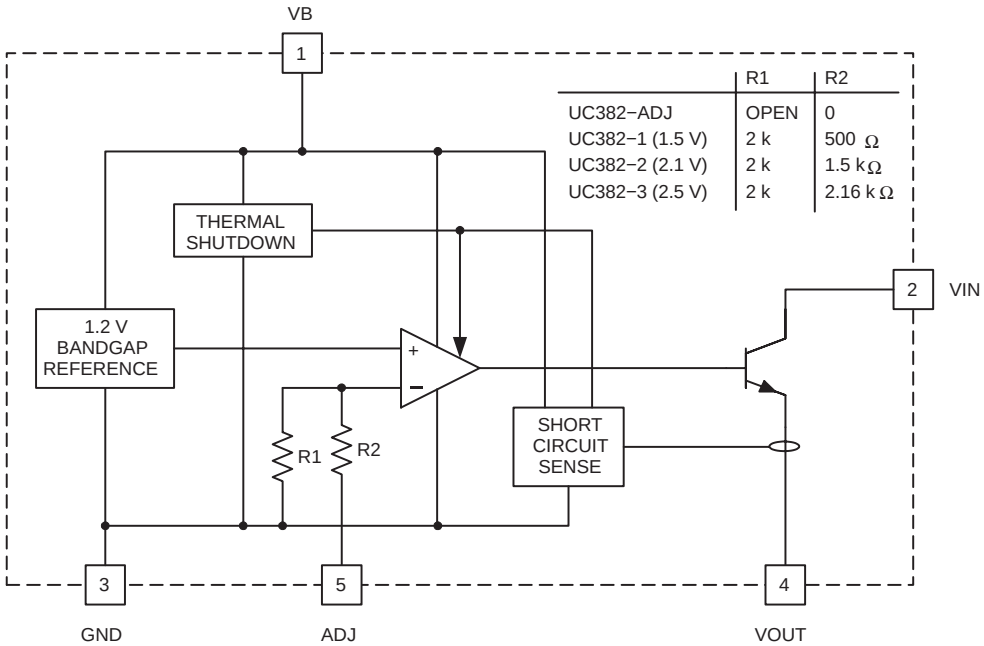
description

The UC382 is a low-dropout-linear regulator providing a quick response to fast load changes. Combined with its precision onboard reference, the UC382 excels at driving GTL and BTL buses. Due to its fast response to load transients, the total capacitance required to decouple the regulator's output can be significantly decreased when compared to standard LDO linear regulators.

Dropout voltage (VIN to VOUT) is only 450 mV maximum at 100°C and 350 mV typical at 3-A load.

The onboard bandgap reference is stable with temperature and scaled for a 1.2-V input to the internal-power amplifier. The UC382 is available in fixed-output voltages of 1.5 V, 2.1 V, or 2.5 V. The output voltage of the adjustable version can be set with two external resistors. If the external resistors are omitted, the output voltage defaults to 1.2 V.

block diagram



UDG-00080

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absolute maximum ratings over operating free-air temperature (unless otherwise noted)†‡

VB . . . . . 13 V
VIN . . . . . 7.5 V
Output voltage . . . . . 1.2 V to 6.0 V
Storage temperature, T_{stg} . . . . . −65°C to 150°C
Junction temperature, T_J . . . . . −55°C to 150°C
Lead temperature (soldering, 10 seconds) . . . . . 300°C

† 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 or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

‡ Currents are positive into, negative out of the specified terminal. Consult Packaging Section of Databook for thermal limitations and considerations of packages.

AVAILABLE OPTIONS(1)

T_J	PACKAGED DEVICES							
	TO-220 (T)				TO−263 (TD)(2)			
	OUTPUT VOLTAGE				OUTPUT VOLTAGE			
	1.5 V	2.1 V	2.5 V	1.2 V or ADJ	1.5 V	2.1 V	2.5 V	1.2 V or ADJ
–40°C to 100°C	282T-1	282T-2	282T-3	282T-ADJ	282TD-1	282TD-2	282TD-3	282TD-ADJ
0°C to 100°C	382T-1	382T-2	382T-3	382T-ADJ	382TD-1	382TD-2	382TD-3	382TD-ADJ

1. For more package and ordering information, see the Package Option Addendum located at the end of this data sheet.
2. For 50 piece reel, add KTTT (e.g., UC282TDKTTT−1); for 500 piece reel, add TR (e.g., UC282TDTR−1).

electrical characteristics, T_A = −40°C to 100°C for the UC282-X series and 0°C to 100°C for the UC382-X, VB = 5 V, VIN = 3.3 V, VOUT = 2.5 V for the UC382-ADJ, $T_A = T_J$, (unless otherwise stated)

UC382-3 fixed 2.5 V, 3-A family

PARAMETERS	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output voltage (I_{VOUT} = 100 mA)	UC382-3		2.475	2.500	2.525	V
	UC282-3		2.450	2.500	2.525	V
Load regulation	I_{VOUT} = 10 mA to 3 A			0.5	4	mV
VIN PSSR			80	100		dB
VB PSSR			50	60		dB
VIN dropout voltage = VIN−VOUT	I_{VOUT} = 3 A,	T_J = 25°C		350	425	mV
	I_{VOUT} = 3 A,	UC382-3		350	450	mV
	I_{VOUT} = 3 A,	UC282-3		350	500	mV
VB dropout = VB−VOUT	I_{VOUT} = 3 A,	UC382-3		1.8	2.10	V
	I_{VOUT} = 3 A,	UC282-3		1.8	2.20	V
Short circuit current limit			3.3		4.5	A
VB current	I_{VOUT} = 10 mA			6	11	mA
	I_{VOUT} = 3 A			18	60	mA
VIN current	I_{VOUT} = 3 A		2.94	2.97		A

electrical characteristics, T_A = −40°C to 100°C for the UC282-X series and 0°C to 100°C for the UC382-X, VB = 5 V, VIN = 3.3 V, VOUT = 2.5 V for the UC382-ADJ, $T_A = T_J$, (unless otherwise stated)

UC382-2 fixed 2.1 V, 3-A family

PARAMETERS	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output voltage (I_{VOUT} = 100 mA)	UC382-2		2.079	2.100	2.121	V
	UC282-2		2.058	2.100	2.121	V
Load regulation	I_{VOUT} = 10 mA to 3 A			0.5	4	mV
VIN PSSR			80	100		dB
VB PSSR			52	62		dB
VIN dropout voltage = VIN−VOUT	I_{VOUT} = 3 A,	T_J = 25°C		350	425	mV
	I_{VOUT} = 3 A,	UC382-2		350	450	mV
	I_{VOUT} = 3 A,	UC282-2		350	500	mV
VB dropout = VB−VOUT	I_{VOUT} = 3 A,	UC382-2		1.8	2.10	V
	I_{VOUT} = 3 A,	UC282-2		1.8	2.20	V
Short circuit current limit			3.3		4.5	A
VB current	I_{VOUT} = 10 mA			6	11	mA
	I_{VOUT} = 3 A			18	60	mA
VIN current	I_{VOUT} = 3 A		2.94	2.97		A

UC382-1 fixed 1.5 V, 3-A family

PARAMETERS	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output voltage (I_{VOUT} = 100 mA)	UC382-1		1.485	1.500	1.515	V
	UC282-1		1.470	1.500	1.515	V
Load regulation	I_{VOUT} = 10 mA to 3 A			0.5	4	mV
VIN PSSR			80	100		dB
VB PSSR			55	65		dB
VIN dropout voltage = VIN−VOUT	I_{VOUT} = 3 A,	T_J = 25°C		350	425	mV
	I_{VOUT} = 3 A,	UC382-1		350	450	mV
	I_{VOUT} = 3 A,	UC282-1		350	500	mV
VB dropout = VB−VOUT	I_{VOUT} = 3 A,	UC382-1		1.8	2.10	V
	I_{VOUT} = 3 A,	UC282-1		1.8	2.20	V
Short circuit current limit			3.3		4.5	A
VB current	I_{VOUT} = 10 mA			6	11	mA
	I_{VOUT} = 3 A			18	60	mA
VIN current	I_{VOUT} = 3 A		2.94	2.97		A

electrical characteristics, T_A = −40°C to 100°C for the UC282-X series and 0°C to 100°C for the UC382-X, VB = 5 V, VIN = 3.3 V, VOUT = 2.5 V for the UC382-ADJ, $T_A = T_J$, (unless otherwise stated)

UC382-ADJ adjustable, 3-A family

PARAMETERS	TEST CONDITIONS		MIN	TYP	MAX	UNITS
ADJ voltage (I_{VOUT} = 100 mA)	UC382-ADJ		1.188	1.200	1.212	V
	UC282-ADJ		1.176	1.200	1.212	V
Load regulation	I_{VOUT} = 10 mA to 3 A			0.5	4	mV
VIN PSSR	VOUT programmed for 2.5 V		80	100		dB
VB PSSR	VOUT programmed for 2.5 V		50	60		dB
VIN dropout voltage = VIN−VOUT	I_{VOUT} = 3 A,	T_J = 25°C		350	425	mV
	I_{VOUT} = 3 A,	UC382-ADJ		350	450	mV
	I_{VOUT} = 3 A,	UC282-ADJ		350	500	mV
VB dropout = VB−VOUT	I_{VOUT} = 3 A,	UC382-ADJ		1.8	2.10	V
	I_{VOUT} = 3 A,	UC282-ADJ		1.8	2.20	V
Short circuit current limit			3.3		4.5	A
VB current	I_{VOUT} = 10 mA			6	11	mA
	I_{VOUT} = 3 A			18	60	mA
VIN current	I_{VOUT} = 3 A		2.94	2.97		A

pin descriptions

ADJ: In the adjustable version, the user programs the output voltage with two external resistors. The resistors should be 0.1% for high accuracy. The output amplifier is configured as a non-inverting-operational amplifier. The resistors should meet the criteria of R3 || R4 < 100 Ω. Connect ADJ to VOUT for an output voltage of 1.2 V. Note that the point at which the feedback network is connected to the output is the Kelvin sense point. For -1, -2, and -3 versions, ADJ pin is tied to VOUT to obtain specified output voltage.

GND: For accurate results, the GND pin should be referenced to the load ground.

VB: Supplies power to all circuits of the regulator except the collector of the output-power transistor. The 2-V headroom from VB to VOUT allows the use of a Darlington output stage for inherently-low-output impedance and fast response. (Dropout is derated for junction temperatures below 0°C.)

VIN: Supplies the current to the collector of the output-power transistor only. The dropout (VIN−VOUT) is under 100 mV for light loads; maximum dropout is 450 mV at 3 A for T_J = 0°C to 100°C. (Dropout is derated for junction temperatures over 100°C.) At full load, the majority of the VB current is going to the load.

VOUT: This pin should be connected to the load via a low impedance path. Avoid connectors which add significant inductance and resistance. Note that even though a Kelvin sense is available through a 5-pin package, care must be taken since voltage drops along wire traces add to the dropout voltage.

pin descriptions (continued)

DROPOUT VOLTAGE ($V_B - V_{OUT}$) vs LOAD CURRENT

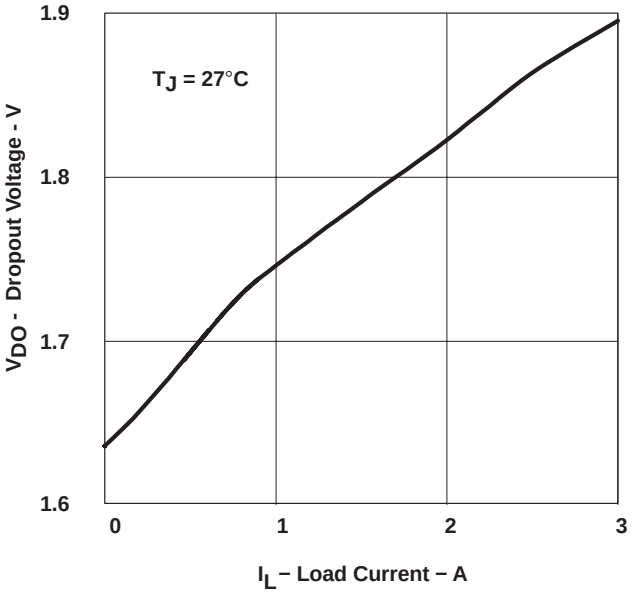


Figure 1

DROPOUT VOLTAGE ($V_{IN} - V_{OUT}$) vs LOAD CURRENT

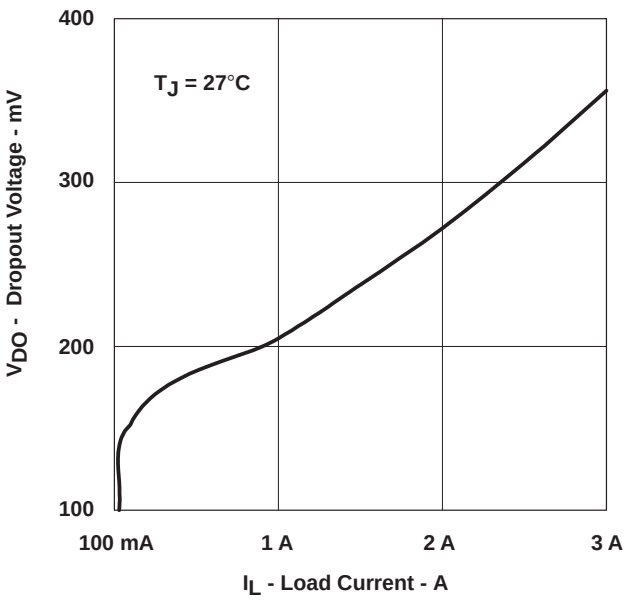


Figure 2

APPLICATION INFORMATION

The UC382 is easy to use. The adjustable version requires two 0.1% resistors to set the output voltage. The fixed versions of the UC382 require no external resistors. All versions of the UC382 require decoupling capacitors on the input and output. In a typical application, VB and VIN are driven from switching power supplies which may have large filter capacitors at their outputs. If the UC382 is further than 12 inches from the power supply, it is recommended to add local decoupling as close as possible to the linear regulator.

Decouple the output of the UC382 with at least 100 μF of high-quality tantalum or Sanyo OSCON capacitors close to the VOUT pin for maximum stability. Many applications involving Ultra-Fast GTL or BTL applications require additional capacitance close to the load. The exact amount will vary according to speed and magnitude of the load transients and the tolerance allowed for transients on VOUT. When specifying the decoupling capacitors, the series resistance of the capacitor bank is an important factor in its ability to filter load transients.

The UC382 allows for Kelvin sensing the voltage at the load. This improves regulation performance and eliminates the voltage drops due to wire-trace resistance. This voltage drop must be added to the headroom (VIN to VOUT and VB to VOUT). The dropout of 450 mV is measured at the pins and does not include additional drops due to trace resistance. The minimum load current is 10 mA.

Two or more UC382's may be used in parallel. While stable, this arrangement does degrade the transient response.

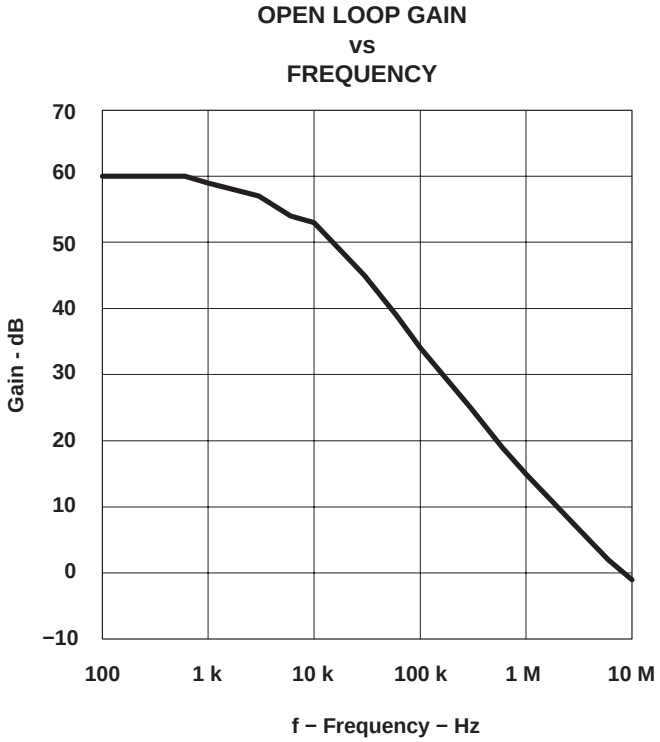


Figure 3

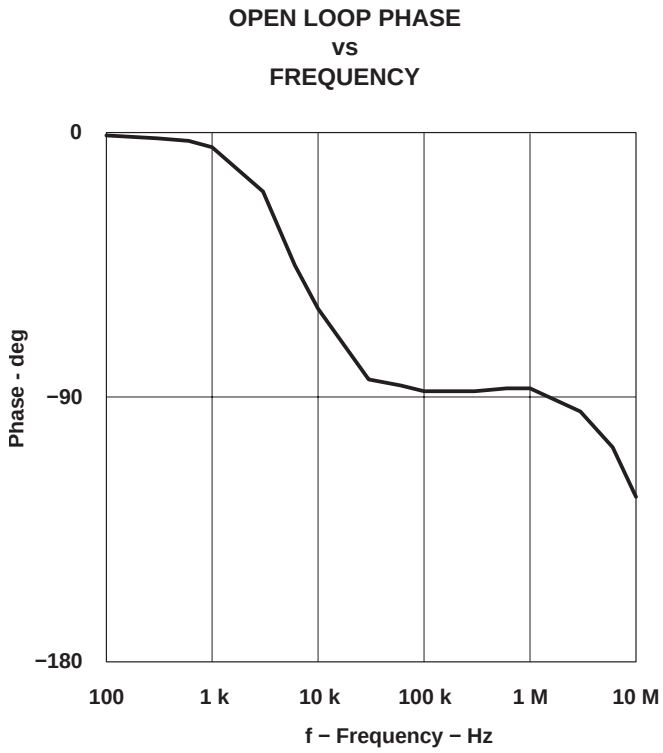


Figure 4

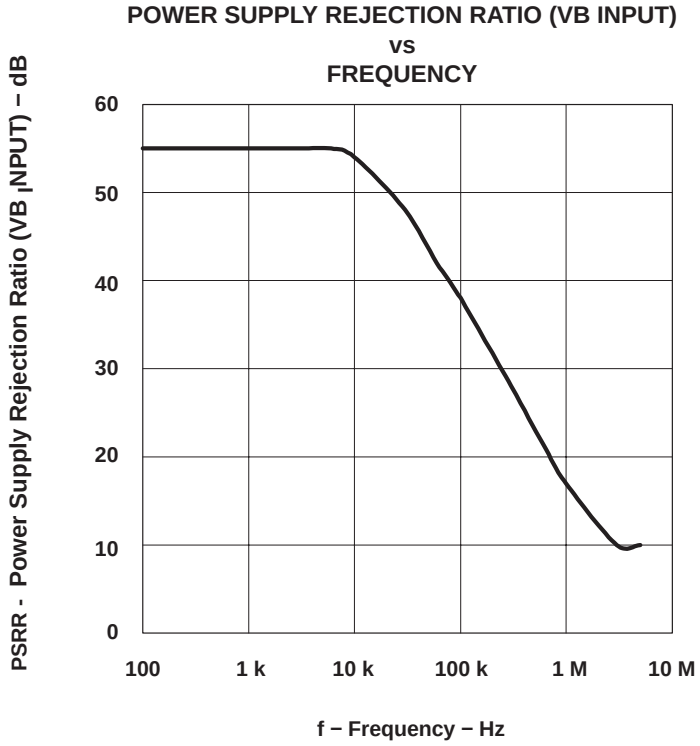


Figure 5

APPLICATION INFORMATION

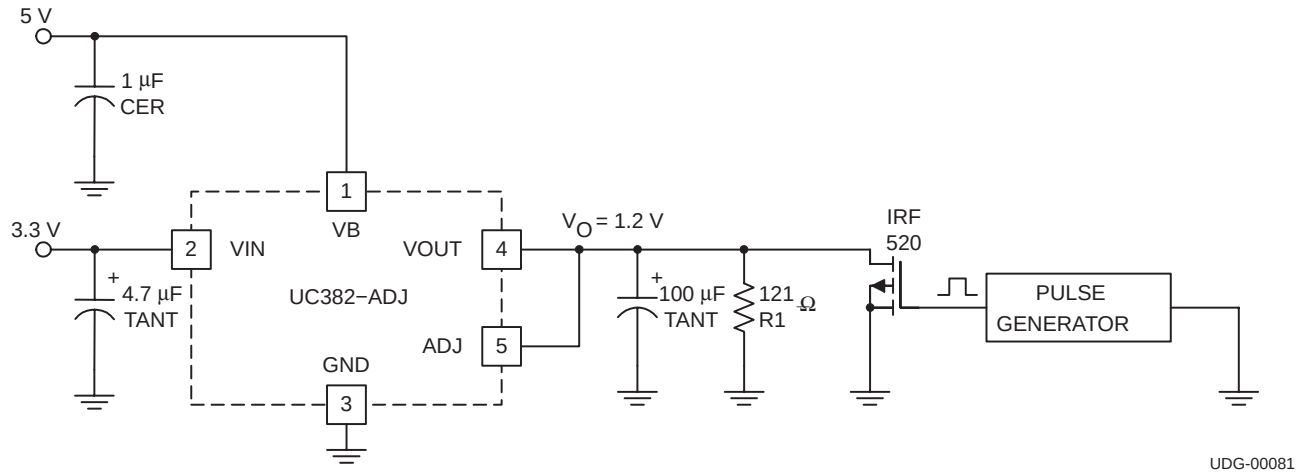


Figure 6. Transient Test Circuit

10 mA to 3 A/µs Load Transient Response

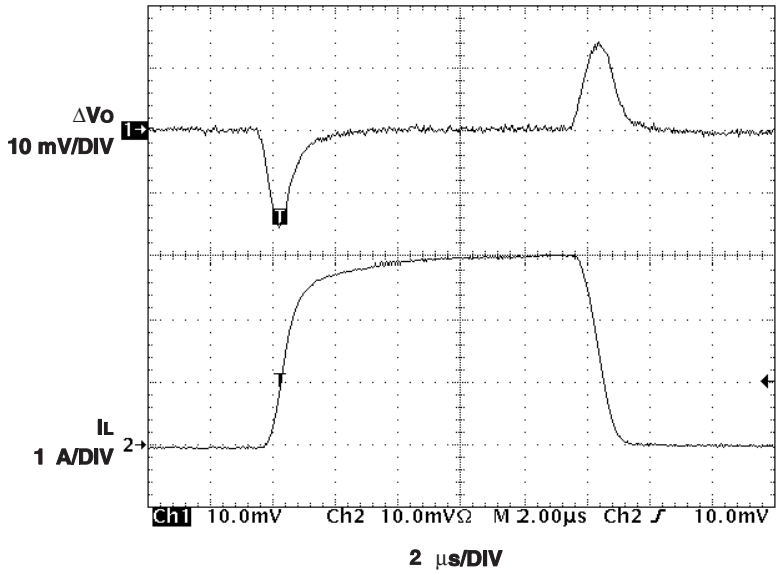
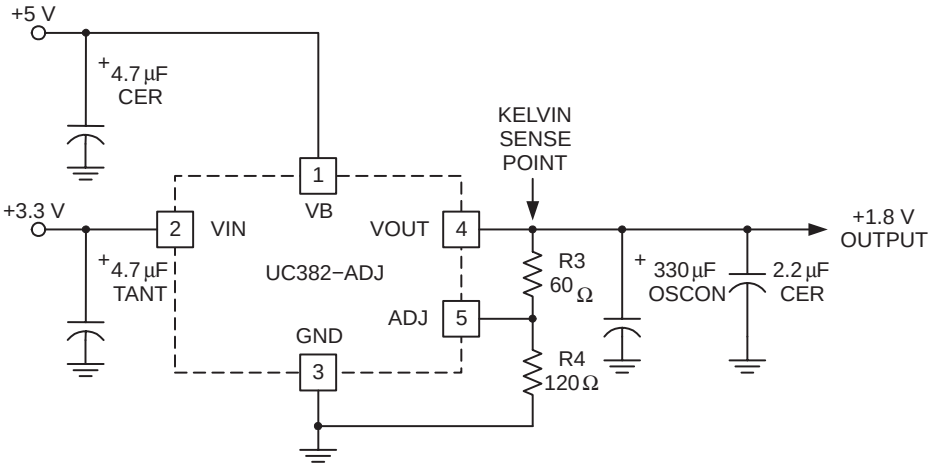


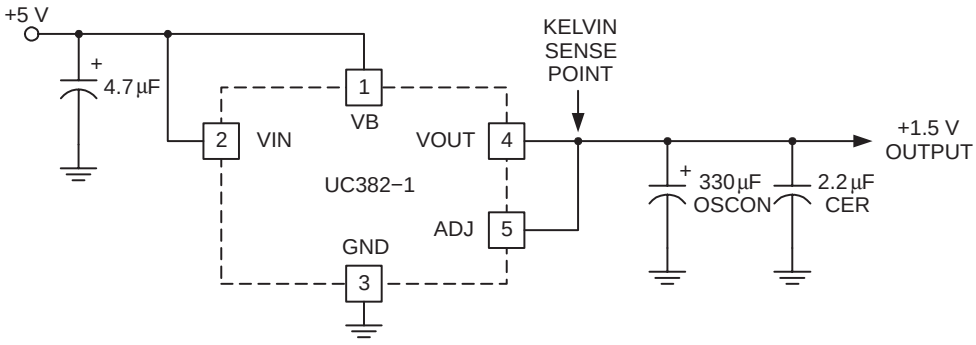
Figure 7

APPLICATION INFORMATION



UDG-00082

Figure 8. Typical UC382-ADJ Application



UDG-00083

Figure 9. Typical UC382-1, -2, or -3 Application

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
UC282T-ADJ	ACTIVE	TO-220	KC	5	50	RoHS & Green	SN	N / A for Pkg Type	-40 to 100	UC282T-ADJ	Samples
UC282TDKTTT-1	ACTIVE	DDPAK/ TO-263	KTT	5	50	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 100	UC282TD-1	Samples
UC282TDTR-3	ACTIVE	DDPAK/ TO-263	KTT	5	500	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 100	UC282TD-3	Samples
UC282TDTR-ADJ	ACTIVE	DDPAK/ TO-263	KTT	5	500	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 100	UC282TD-ADJ	Samples
UC382T-ADJ	ACTIVE	TO-220	KC	5	50	RoHS & Green	SN	N / A for Pkg Type		UC382T-ADJ	Samples
UC382T-ADJG3	ACTIVE	TO-220	KC	5	50	RoHS & Green	SN	N / A for Pkg Type	0 to 100	UC382T-ADJ	Samples
UC382TDKTTT-2	ACTIVE	DDPAK/ TO-263	KTT	5	50	RoHS & Green	SN	Level-2-260C-1 YEAR	0 to 70	UC382TD-2	Samples
UC382TDTR-ADJ	ACTIVE	DDPAK/ TO-263	KTT	5	500	RoHS & Green	SN	Level-2-260C-1 YEAR		UC382TD-ADJ	Samples
UC382TDTR-ADJG3	ACTIVE	DDPAK/ TO-263	KTT	5	500	TBD	Call TI	Call TI	0 to 100		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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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.

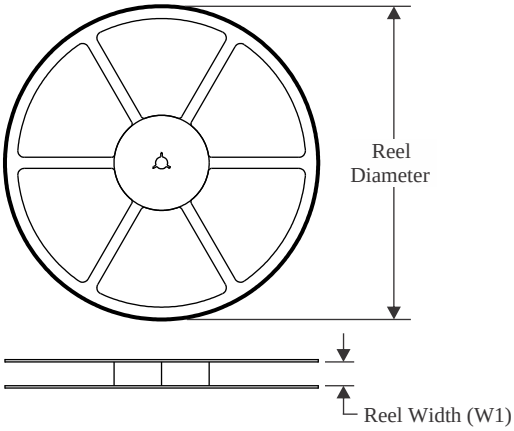
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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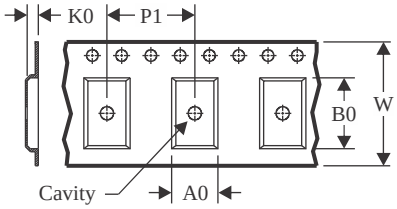
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

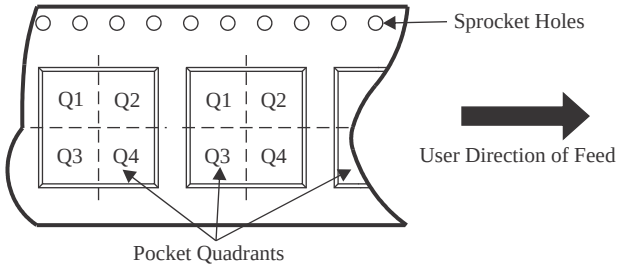


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

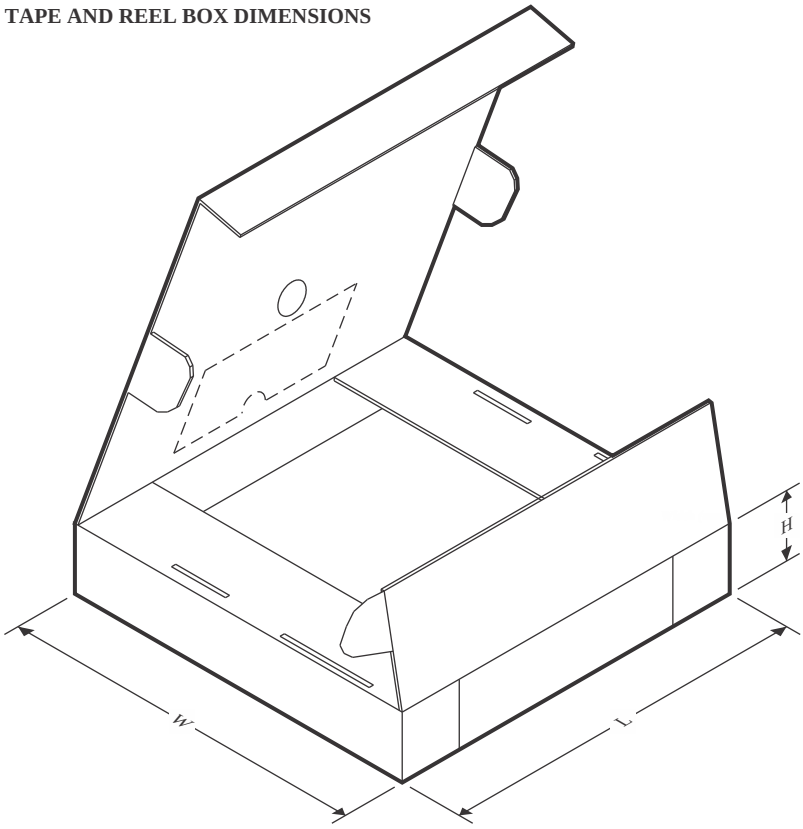
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
UC282TDTR-3	DDPAK/ TO-263	KTT	5	500	330.0	24.4	10.6	15.6	4.9	16.0	24.0	Q2
UC282TDTR-ADJ	DDPAK/ TO-263	KTT	5	500	330.0	24.4	10.6	15.6	4.9	16.0	24.0	Q2
UC382TDTR-ADJ	DDPAK/ TO-263	KTT	5	500	330.0	24.4	10.6	15.6	4.9	16.0	24.0	Q2

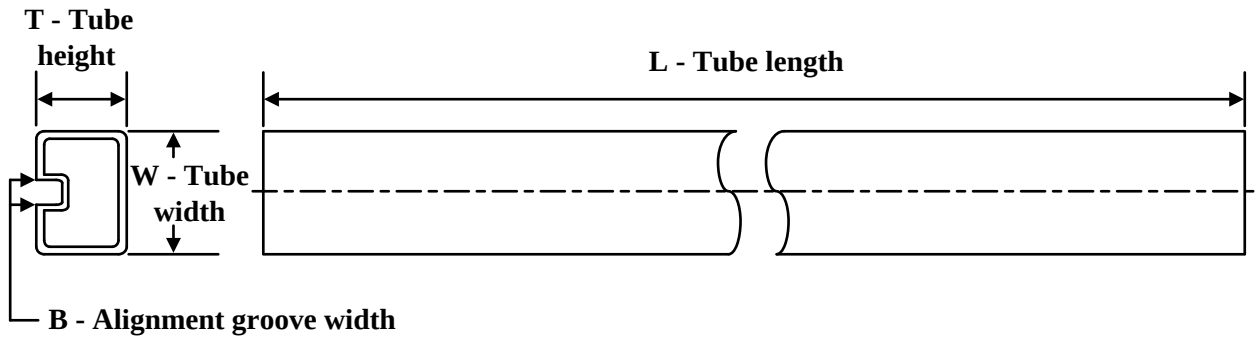
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UC282TDTR-3	DDPAK/TO-263	KTT	5	500	367.0	367.0	45.0
UC282TDTR-ADJ	DDPAK/TO-263	KTT	5	500	367.0	367.0	45.0
UC382TDTR-ADJ	DDPAK/TO-263	KTT	5	500	367.0	367.0	45.0

TUBE



*All dimensions are nominal

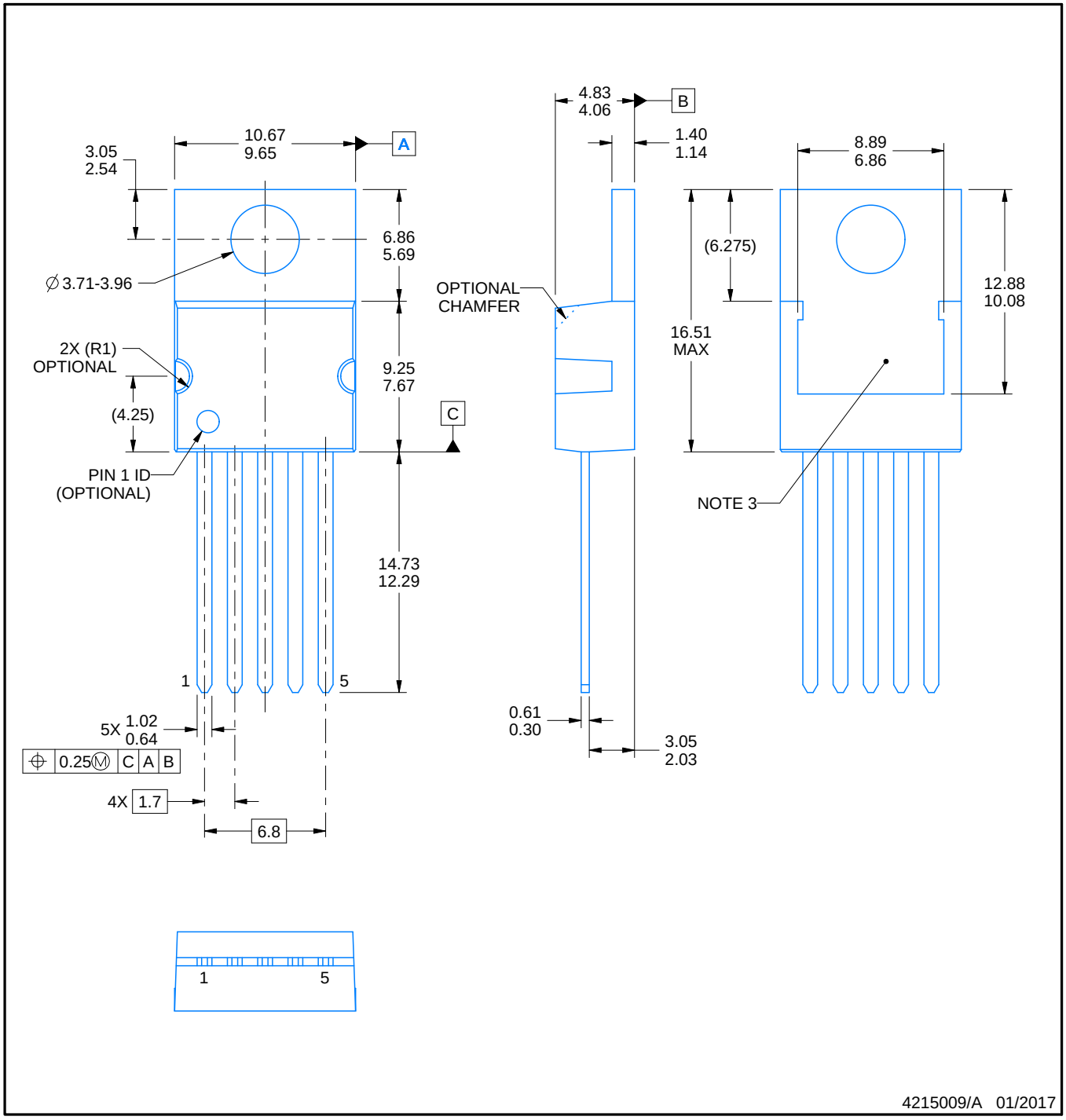
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
UC282T-ADJ	KC	TO-220	5	50	546	31	11930	3.17
UC382T-ADJ	KC	TO-220	5	50	546	31	11930	3.17
UC382T-ADJG3	KC	TO-220	5	50	546	31	11930	3.17

KC0005A

PACKAGE OUTLINE

TO-220 - 16.51 mm max height

TO-220



NOTES:

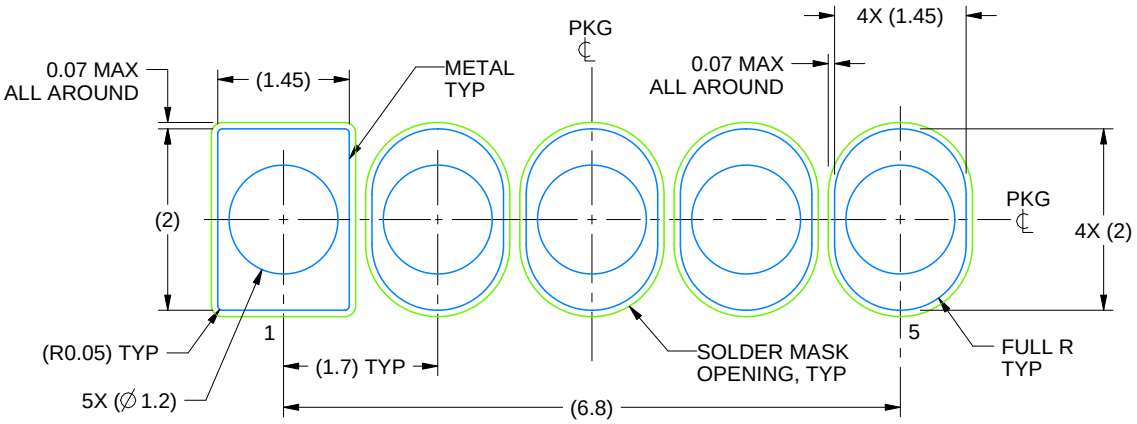
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Shape may vary per different assembly sites.

EXAMPLE BOARD LAYOUT

KC0005A

TO-220 - 16.51 mm max height

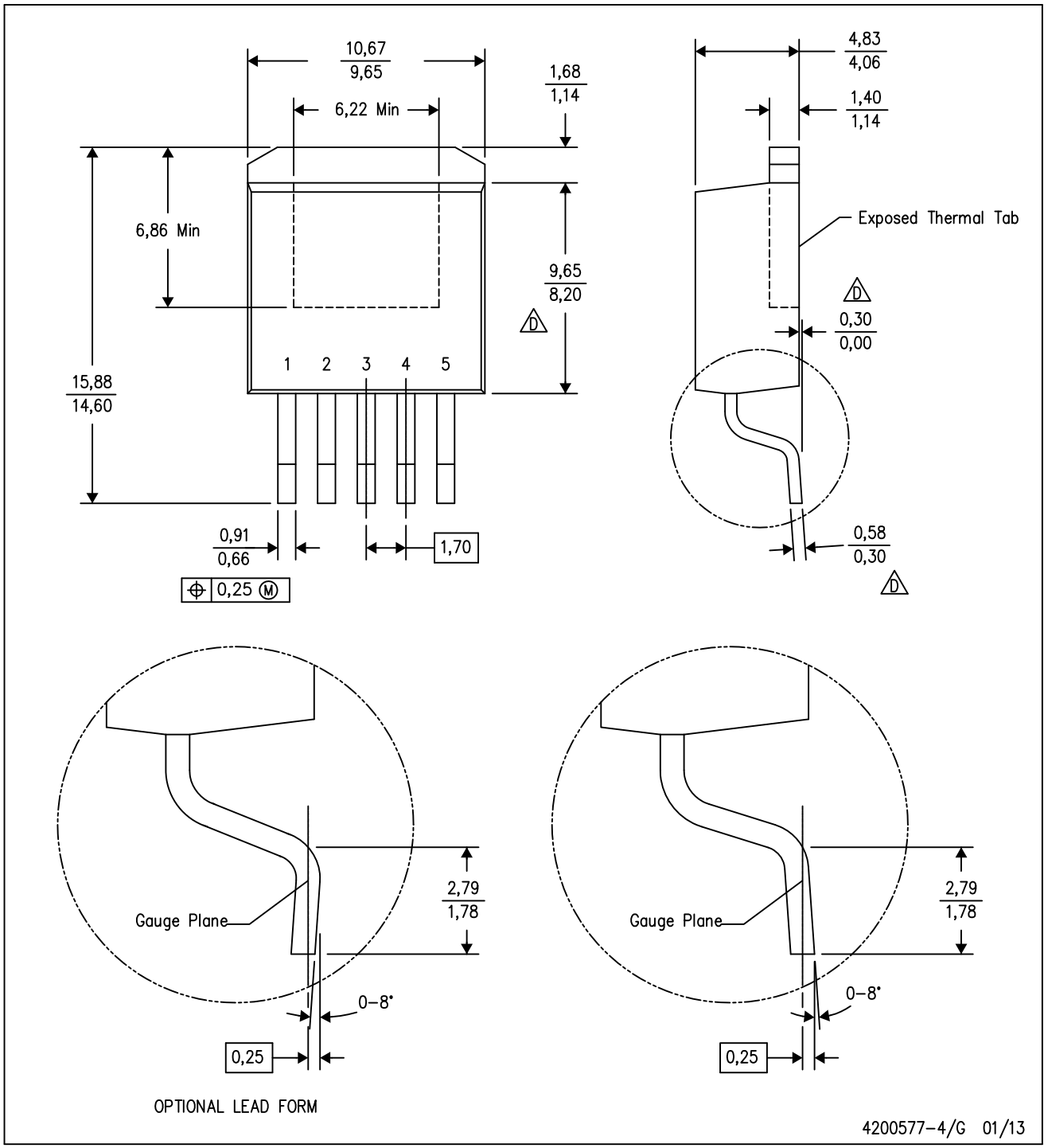
TO-220



LAND PATTERN
NON-SOLDER MASK DEFINED
SCALE:12X

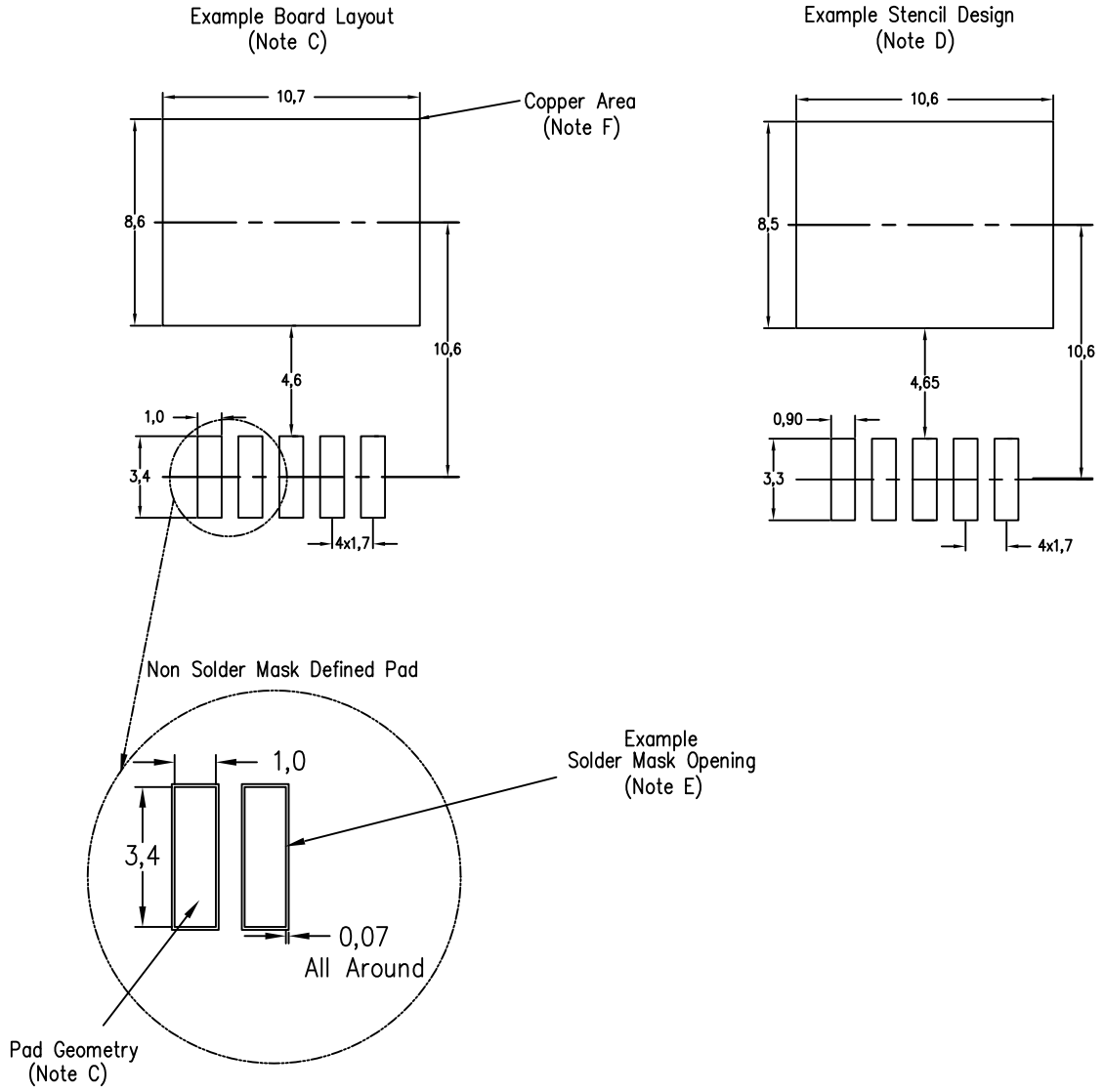
4215009/A 01/2017

KTT (R–PSFM–G5) PLASTIC FLANGE–MOUNT PACKAGE



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. Mold flash or protrusion not to exceed 0.005 (0,13) per side.
D. 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:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–SM–782 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. Refer to IPC–7525.
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.
F. 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.

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