

μA78xx Fixed Positive Voltage Regulators

1 Features

- 3-Terminal Regulators
- Available in fixed 5-V/8-V/10-V/12-V/15-V/24-V options
- Output Current up to 1.5 A
- Internal Thermal-Overload Protection
- High Power-Dissipation Capability
- Internal Short-Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Capacitor Not Needed for Stability

2 Applications

- On-card Regulation
- Portable Devices
- Computing & Servers
- Telecommunications

3 Description

This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
μA78xx	TO-220 (3)	10.16 mm x 8.82 mm
	TO-220 (3)	10.16 mm x 8.82 mm
	TO-263 (3)	10.06 mm x 9.02 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

4 Simplified Schematic

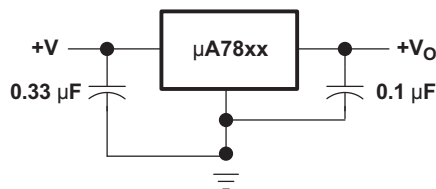


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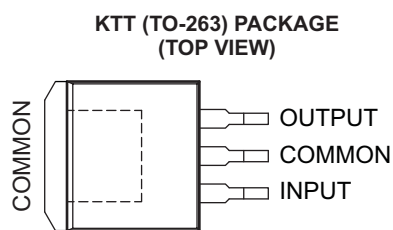
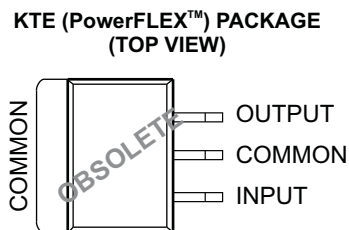
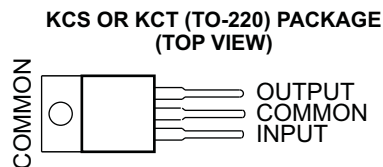
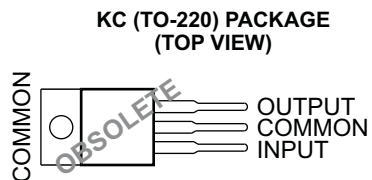
5 Revision History

Changes from Revision O (August 2012) to Revision P

Page

- Added *Applications*, *Device Information* table, *Pin Functions* table, *ESD Ratings* table, *Thermal Information* table, *Typical Characteristics*, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section. **1**
- Deleted *Ordering Information* table. **1**

6 Pin Configuration and Functions



Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
COMMON	2	—	Ground
INPUT	1	I	Supply Input
OUTPUT	3	O	Voltage Output

7 Specifications

7.1 Absolute Maximum Ratings

over virtual junction temperature range (unless otherwise noted)

		MIN	MAX	UNIT
V_I	Input voltage	μ A7824C	40	V
		All others	35	
T_J	Operating virtual junction temperature		150	°C
	Lead temperature	1,6 mm (1/16 in) from case for 10 s	260	°C
T_{stg}	Storage temperature range		–65	150

7.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾	3000
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾	2000

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

7.3 Recommended Operating Conditions

		MIN	MAX	UNIT
V_I	Input voltage	μ A7805	7	25
		μ A7808	10.5	25
		μ A7810	12.5	28
		μ A7812	14.5	30
		μ A7815	17.5	30
		μ A7824	27	38
I_O	Output current		1.5	A
T_J	Operating virtual junction temperature	0	125	°C

7.4 Thermal Information

THERMAL METRIC ⁽¹⁾		μ A78XX			UNIT
		KTE	KCS, KCT, KC	KTT	
		3 PINS	3 PINS	3 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	23	19	25.3	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	3	17	18	
$R_{\theta JP(top)}$	Junction-to-exposed-pad thermal resistance	2.7	3	1.94	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report ([SPRA953](#)).

7.5 Electrical Characteristics — uA7805

at specified virtual junction temperature, $V_I = 10\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J ⁽¹⁾	μA7805C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 7\text{ V to }20\text{ V}$, $P_D \leq 15\text{ W}$	25°C	4.8	5	5.2	V
		0°C to 125°C	4.75		5.25	
Input voltage regulation	$V_I = 7\text{ V to }25\text{ V}$	25°C		3	100	mV
	$V_I = 8\text{ V to }12\text{ V}$			1	50	
Ripple rejection ⁽²⁾	$V_I = 8\text{ V to }12\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	62	78		dB
	$V_I = 8\text{ V to }12\text{ V}$, $f = 120\text{ Hz (KCT)}$			68		
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		15	100	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			5	50	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.017		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		–1.1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		40		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.2	8	mA
Bias current change	$V_I = 7\text{ V to }25\text{ V}$	0°C to 125°C			1.3	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		750		mA
Peak output current		25°C		2.2		A

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.

(2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.6 Electrical Characteristics — uA7808

at specified virtual junction temperature, $V_I = 14\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$T_J^{(1)}$	μA7808C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 10.5\text{ V to }23\text{ V}$, $P_D \leq 15\text{ W}$	25°C	7.7	8	8.3	V
		0°C to 125°C	7.6		8.4	
Input voltage regulation	$V_I = 10.5\text{ V to }25\text{ V}$	25°C		6	160	mV
	$V_I = 11\text{ V to }17\text{ V}$			2	80	
Ripple rejection ⁽²⁾	$V_I = 11.5\text{ V to }21.5\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	55	72		dB
	$V_I = 11.5\text{ V to }21.5\text{ V}$, $f = 120\text{ Hz}$ (KCT)			62		
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		12	160	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	80	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.016		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		–0.8		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		52		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	$V_I = 10.5\text{ V to }25\text{ V}$	0°C to 125°C			1	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		450		mA
Peak output current		25°C		2.2		A

- (1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.
- (2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.7 Electrical Characteristics — uA7810

at specified virtual junction temperature, $V_I = 17\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J ⁽¹⁾	μA7810C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 12.5\text{ V to }25\text{ V}$, $P_D \leq 15\text{ W}$	25°C	9.6	10	10.4	V
		0°C to 125°C	9.5		10.5	
Input voltage regulation	$V_I = 12.5\text{ V to }28\text{ V}$	25°C		7	200	mV
	$V_I = 14\text{ V to }20\text{ V}$			2	100	
Ripple rejection ⁽²⁾	$V_I = 13\text{ V to }23\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	55	71		dB
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		12	200	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	100	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.018		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		70		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	$V_I = 12.5\text{ V to }28\text{ V}$	0°C to 125°C			1	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		400		mA
Peak output current		25°C		2.2		A

- (1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.
- (2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.8 Electrical Characteristics — uA7812

at specified virtual junction temperature, $V_I = 19\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$T_J^{(1)}$	μA7812C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 14.5\text{ V to }27\text{ V}$, $P_D \leq 15\text{ W}$	25°C	11.5	12	12.5	V
		0°C to 125°C	11.4		12.6	
Input voltage regulation	$V_I = 14.5\text{ V to }30\text{ V}$	25°C		10	240	mV
	$V_I = 16\text{ V to }22\text{ V}$			3	120	
Ripple rejection ⁽²⁾	$V_I = 15\text{ V to }25\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	55	71		dB
	$V_I = 15\text{ V to }25\text{ V}$, $f = 120\text{ Hz (KCT)}$			61		
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		12	240	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	120	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.018		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		75		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.3	8	mA
Bias current change	$V_I = 14.5\text{ V to }30\text{ V}$	0°C to 125°C			1	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		350		mA
Peak output current		25°C		2.2		A

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.

(2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.9 Electrical Characteristics — uA7815

at specified virtual junction temperature, $V_I = 23\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_J ⁽¹⁾	μA7815C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 17.5\text{ V to }30\text{ V}$, $P_D \leq 15\text{ W}$	25°C	14.4	15	15.6	V
		0°C to 125°C	14.25		15.75	
Input voltage regulation	$V_I = 17.5\text{ V to }30\text{ V}$	25°C		11	300	mV
	$V_I = 20\text{ V to }26\text{ V}$			3	150	
Ripple rejection ⁽²⁾	$V_I = 18.5\text{ V to }28.5\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	54	70		dB
	$V_I = 18.5\text{ V to }28.5\text{ V}$, $f = 120\text{ Hz}$ (KCT)			60		
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		12	300	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	150	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.019		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		–1		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		90		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.4	8	mA
Bias current change	$V_I = 17.5\text{ V to }30\text{ V}$	0°C to 125°C			1	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		230		mA
Peak output current		25°C		2.1		A

- (1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.
- (2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.10 Electrical Characteristics — uA7824

at specified virtual junction temperature, $V_I = 33\text{ V}$, $I_O = 500\text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$T_J^{(1)}$	μA7824C			UNIT
			MIN	TYP	MAX	
Output voltage	$I_O = 5\text{ mA to }1\text{ A}$, $V_I = 27\text{ V to }38\text{ V}$, $P_D \leq 15\text{ W}$	25°C	23	24	25	V
		0°C to 125°C	22.8		25.2	
Input voltage regulation	$V_I = 27\text{ V to }38\text{ V}$	25°C		18	480	mV
	$V_I = 30\text{ V to }36\text{ V}$			6	240	
Ripple rejection ⁽²⁾	$V_I = 28\text{ V to }38\text{ V}$, $f = 120\text{ Hz}$	0°C to 125°C	50	66		dB
Output voltage regulation	$I_O = 5\text{ mA to }1.5\text{ A}$	25°C		12	480	mV
	$I_O = 250\text{ mA to }750\text{ mA}$			4	240	
Output resistance	$f = 1\text{ kHz}$	0°C to 125°C		0.028		Ω
Temperature coefficient of output voltage	$I_O = 5\text{ mA}$	0°C to 125°C		-1.5		mV/°C
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$	25°C		170		μV
Dropout voltage	$I_O = 1\text{ A}$	25°C		2		V
Bias current		25°C		4.6	8	mA
Bias current change	$V_I = 27\text{ V to }38\text{ V}$	0°C to 125°C			1	mA
	$I_O = 5\text{ mA to }1\text{ A}$				0.5	
Short-circuit output current		25°C		150		mA
Peak output current		25°C		2.1		A

- (1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33- μF capacitor across the input and a 0.1- μF capacitor across the output.
- (2) This parameter is validated by design and verified during product characterization. It is not tested in production.

7.11 Typical Characteristics

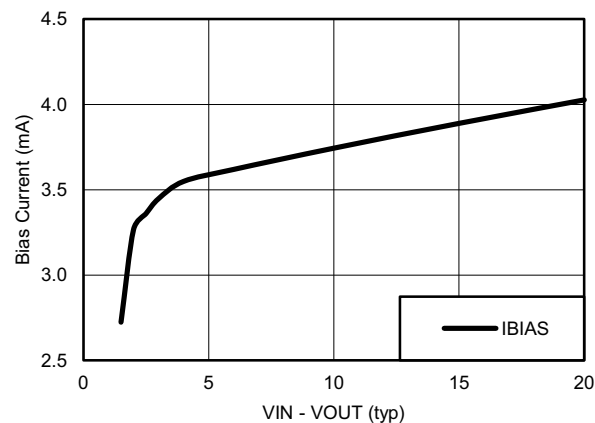


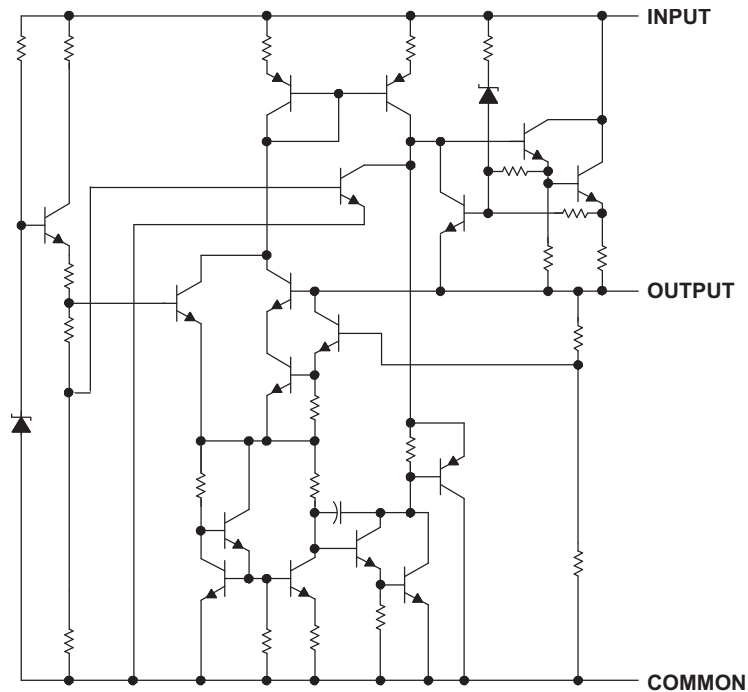
Figure 1. μA7805 Bias Current vs Voltage Differential at 25°C

8 Detailed Description

8.1 Overview

This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

8.2 Functional Schematic



8.3 Feature Description

8.3.1 Thermal Overload

When the die temperature increases to unwanted levels, the device will reduce the output current to lower its temperature. Under heavy loads, the device may alternate between on and off output states to regulate temperature.

8.3.2 Short-Circuit Current Limiting

In the event of a short circuit, the device will limit its own current to safe levels by lowering the bias voltage of internal pass transistors. If the device becomes overheated, the thermal overload protection will take over.

8.4 Device Functional Modes

8.4.1 Fixed-Output Mode

These devices are available in fixed-output voltages. See the orderable part list for the desired output.

9 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

The following section shows application details of the $\mu A78xx$ as a linear regulator.

9.2 Typical Application

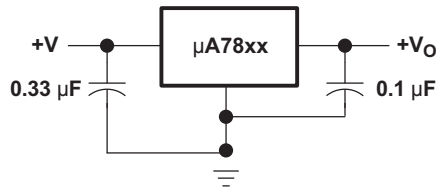


Figure 2. Fixed-Output Regulator

9.2.1 Design Requirements

- Input supply capacitor recommended for filtering noise on the input
- Output supply decoupling capacitor for stabilizing the output

9.2.2 Detailed Design Procedure

9.2.2.1 Operation With a Load Common to a Voltage of Opposite Polarity

In many cases, a regulator powers a load that is not connected to ground but, instead, is connected to a voltage source of opposite polarity (e.g., operational amplifiers, level-shifting circuits, etc.). In these cases, a clamp diode should be connected to the regulator output as shown in Figure 3. This protects the regulator from output polarity reversals during startup and short-circuit operation.

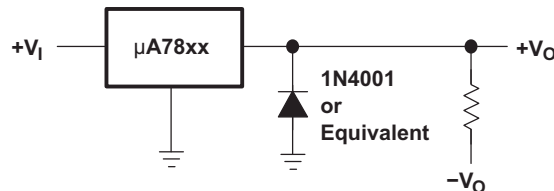


Figure 3. Output Polarity-Reversal-Protection Circuit

9.2.2.2 Reverse-Bias Protection

Occasionally, the input voltage to the regulator can collapse faster than the output voltage. This can occur, for example, when the input supply is crowbarred during an output overvoltage condition. If the output voltage is greater than approximately 7 V, the emitter-base junction of the series-pass element (internal or external) could break down and be damaged. To prevent this, a diode shunt can be used as shown in Figure 4.

Typical Application (continued)

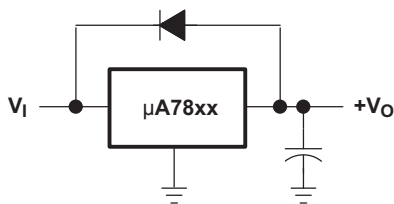


Figure 4. Reverse-Bias-Protection Circuit

9.2.3 Application Curves

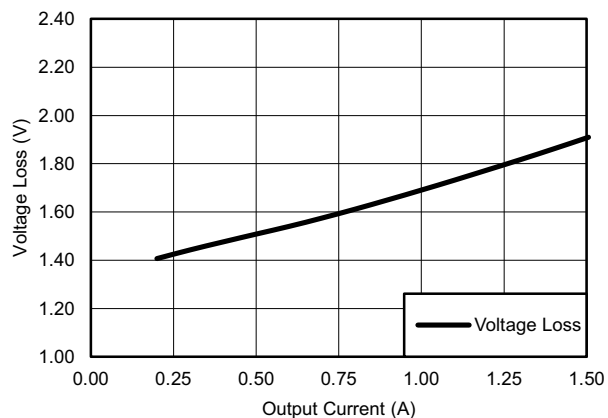


Figure 5. uA7805 Voltage Loss vs Output Current at 25°C

9.2.4 General Configurations

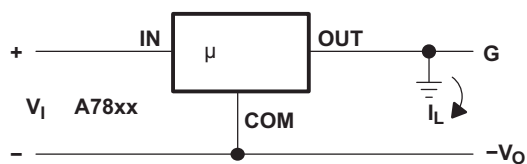
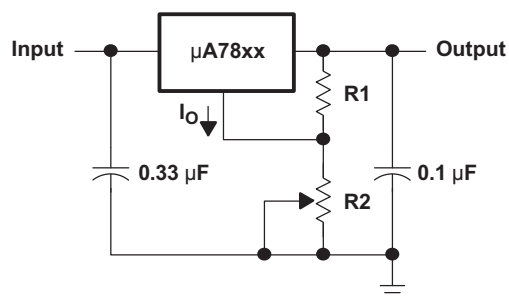


Figure 6. Positive Regulator in Negative Configuration (V_I Must Float)



A: The following formula is used when V_{xx} is the nominal output voltage (output to common) of the fixed regulators

$$V_o = V_{xx} + \left(\frac{V_{xx}}{R1} + I_o \right) R2$$

Figure 7. Adjustable-Output Regulator

Typical Application (continued)

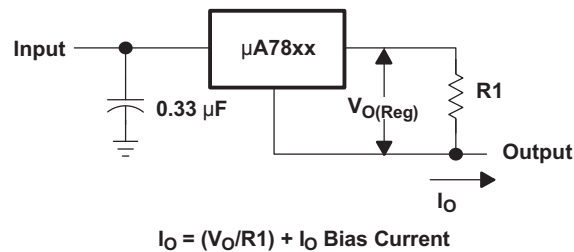


Figure 8. Current Regulator

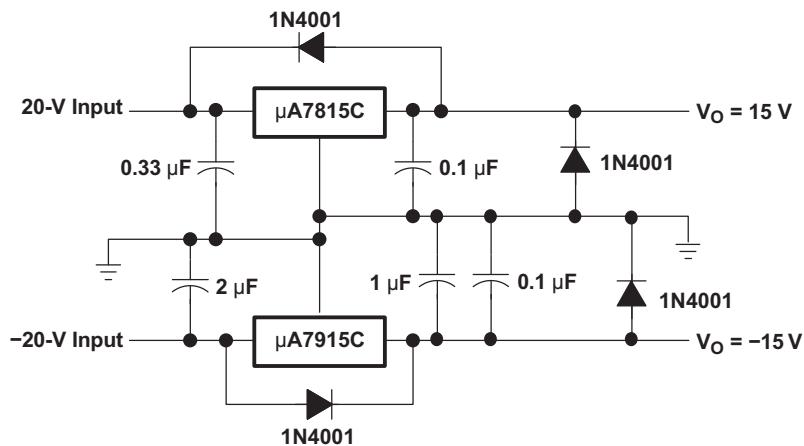


Figure 9. Regulated Dual Supply

10 Power Supply Recommendations

See [Recommended Operating Conditions](#) for the recommended power supply voltages for each variation of the uA78xx device. Different orderable part numbers will be able to tolerate different levels of voltage. It is also recommended to have a decoupling capacitor on the output of the uA78xx device's power supply to limit noise on the device input.

11 Layout

11.1 Layout Guidelines

Keep trace widths large enough to eliminate problematic $I \times R$ voltage drops at the input and output terminals. Input decoupling capacitors should be placed as close to the $\mu A78XX$ as possible.

11.2 Layout Example

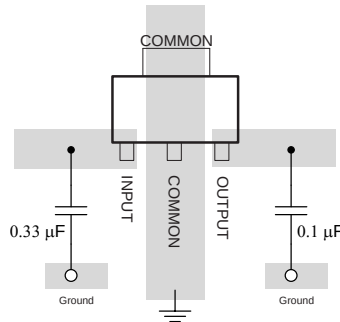


Figure 10. Layout Diagram

12 Device and Documentation Support

12.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 1. Related Links

PARTS	PRODUCT FOLDER	SAMPLE & BUY	TECHNICAL DOCUMENTS	TOOLS & SOFTWARE	SUPPORT & COMMUNITY
$\mu A7805$	Click here	Click here	Click here	Click here	Click here
$\mu A7808$	Click here	Click here	Click here	Click here	Click here
$\mu A7810$	Click here	Click here	Click here	Click here	Click here
$\mu A7812$	Click here	Click here	Click here	Click here	Click here
$\mu A7815$	Click here	Click here	Click here	Click here	Click here
$\mu A7924$	Click here	Click here	Click here	Click here	Click here

12.2 Trademarks

12.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

12.4 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
UA7805CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7805C
UA7805CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7805C
UA7805CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7805C
UA7805CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7805C
UA7805CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7805C
UA7805CKTTRG3	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7805C
UA7808CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7808C
UA7808CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7808C
UA7808CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7808C
UA7808CKCT	Obsolete	Production	TO-220 (KCT) 3	-	-	Call TI	Call TI	0 to 125	
UA7808CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7808C
UA7808CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7808C
UA7810CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7810C
UA7810CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7810C
UA7810CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7810C
UA7810CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7810C
UA7810CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7810C
UA7810CKTTRG3	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7810C
UA7812CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7812C
UA7812CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7812C
UA7812CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7812C
UA7812CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7812C

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
UA7812CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7812C
UA7812CKTTRG3	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7812C
UA7815CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7815C
UA7815CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7815C
UA7815CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7815C
UA7815CKCT	Obsolete	Production	TO-220 (KCT) 3	-	-	Call TI	Call TI	0 to 125	
UA7815CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7815C
UA7815CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7815C
UA7824CKCS	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7824C
UA7824CKCS.A	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7824C
UA7824CKCSE3	Active	Production	TO-220 (KCS) 3	50 TUBE	Yes	SN	N/A for Pkg Type	0 to 125	UA7824C
UA7824CKTTR	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7824C
UA7824CKTTR.A	Active	Production	DDPAK/ TO-263 (KTT) 3	500 LARGE T&R	Yes	SN	Level-3-245C-168 HR	0 to 125	UA7824C

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

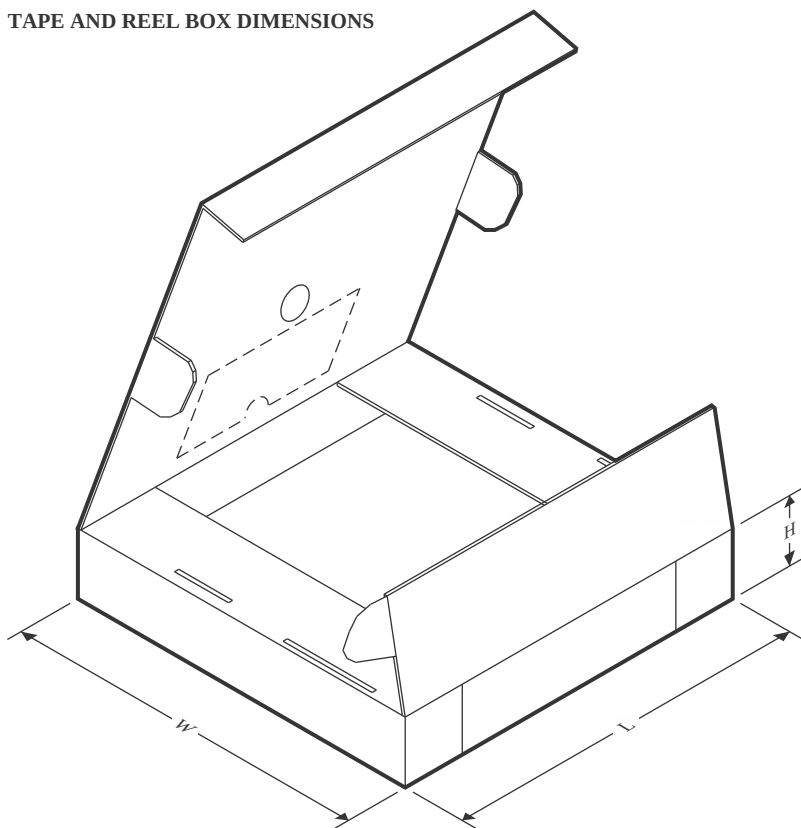
TAPE AND REEL INFORMATION



*All dimensions are nominal

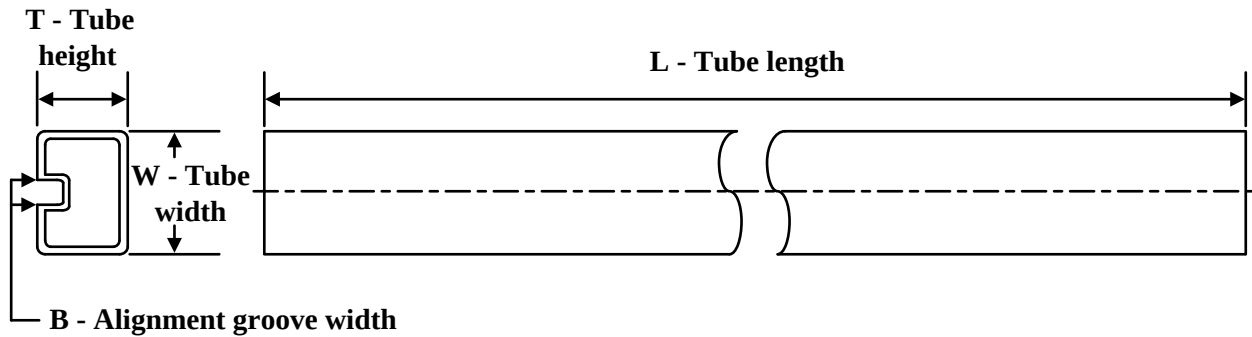
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
UA7805CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
UA7808CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
UA7810CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
UA7812CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
UA7815CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
UA7824CKTTR	DDPAK/ TO-263	KTT	3	500	330.0	24.4	10.8	16.3	5.11	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)
UA7805CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0
UA7808CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0
UA7810CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0
UA7812CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0
UA7815CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0
UA7824CKTTR	DDPAK/TO-263	KTT	3	500	340.0	340.0	38.0

TUBE


*All dimensions are nominal

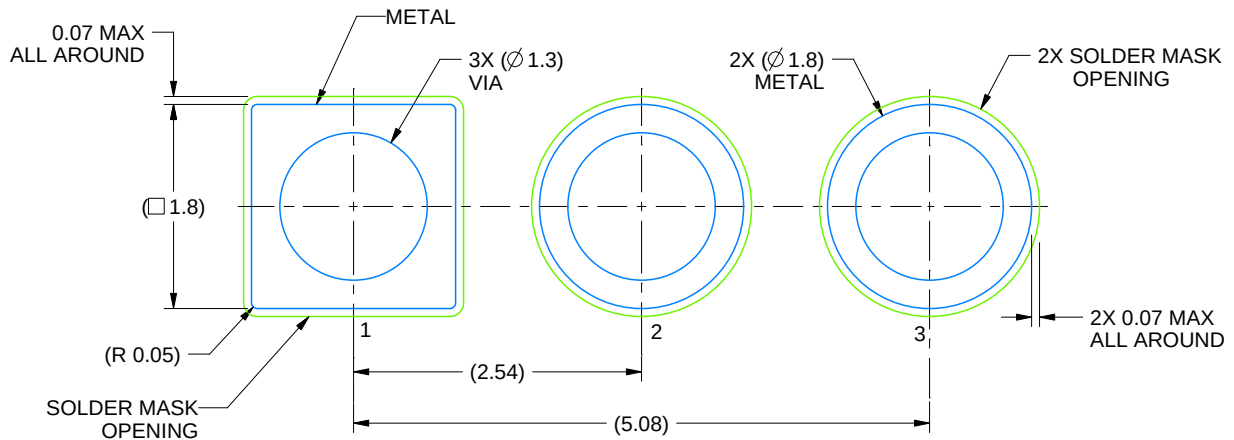
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
UA7805CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7805CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7805CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6
UA7808CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7808CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7808CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6
UA7810CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7810CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7810CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6
UA7812CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7812CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7812CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6
UA7815CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7815CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7815CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6
UA7824CKCS	KCS	TO-220	3	50	532	34.1	700	9.6
UA7824CKCS.A	KCS	TO-220	3	50	532	34.1	700	9.6
UA7824CKCSE3	KCS	TO-220	3	50	532	34.1	700	9.6

EXAMPLE BOARD LAYOUT

KCT0003A

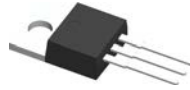
TO-220 - 20.55 mm max height

TO-220



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE:15X

4223034/B 08/2018

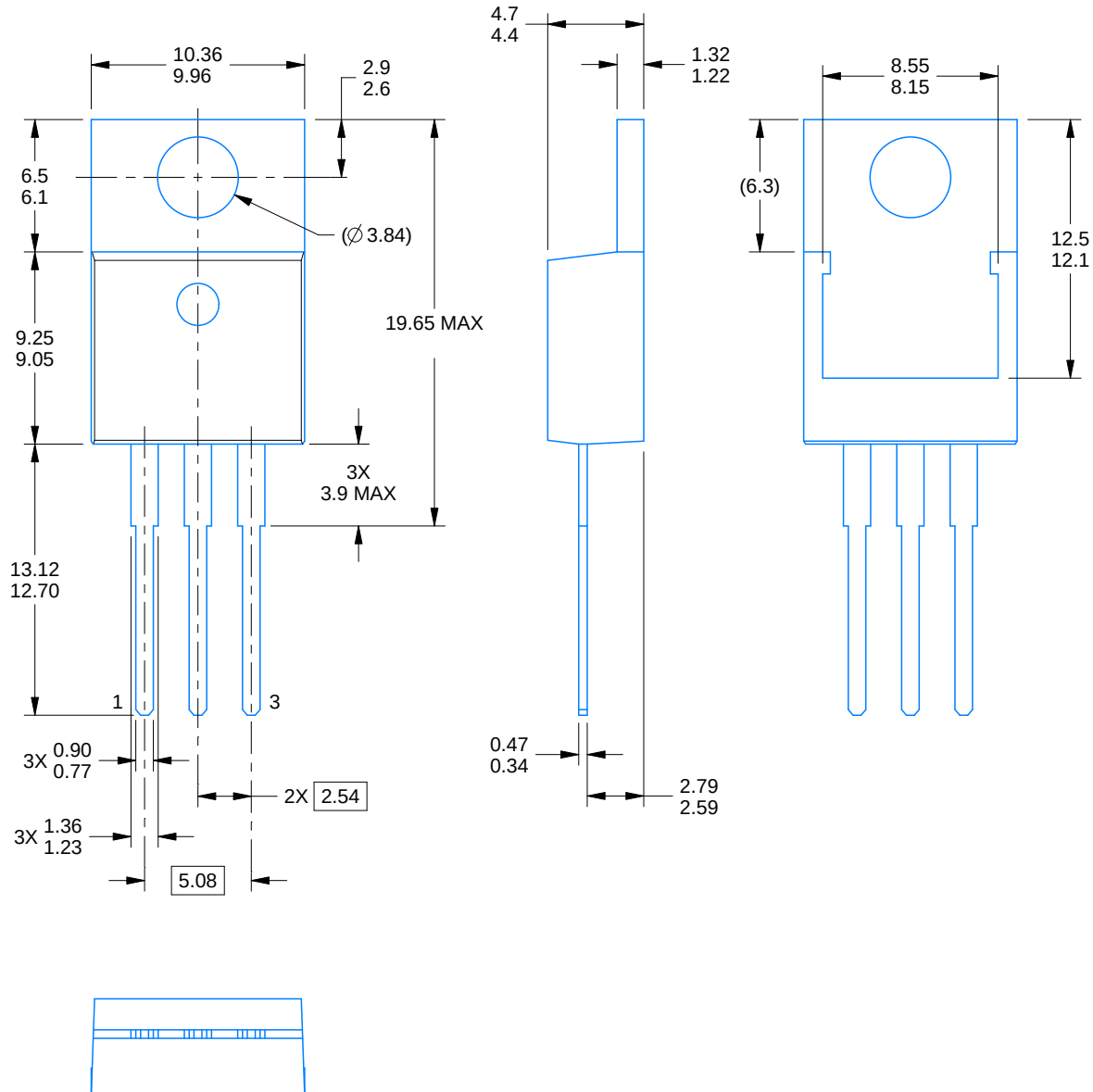


PACKAGE OUTLINE

KCS0003B

TO-220 - 19.65 mm max height

TO-220



4222214/B 08/2018

NOTES:

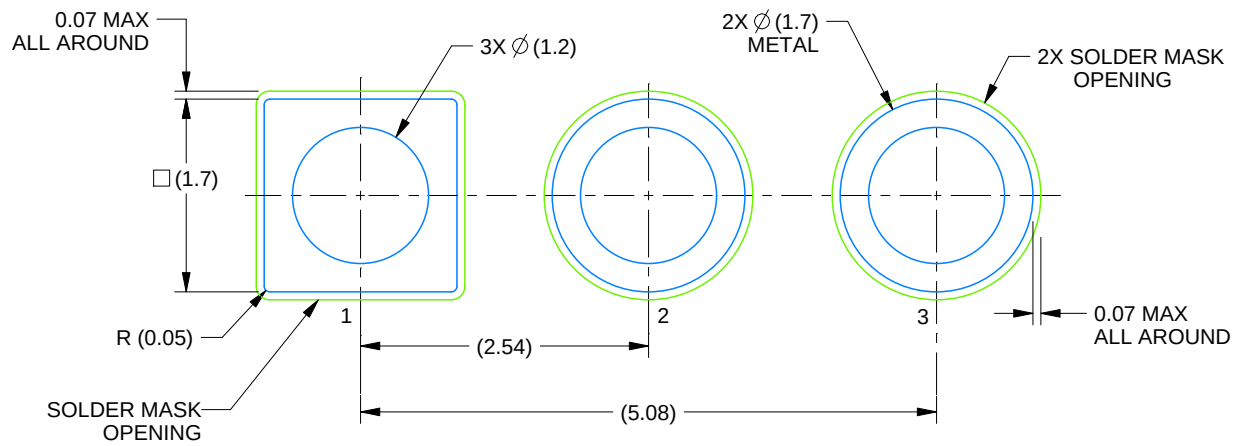
1. Dimensions are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-220.

EXAMPLE BOARD LAYOUT

KCS0003B

TO-220 - 19.65 mm max height

TO-220

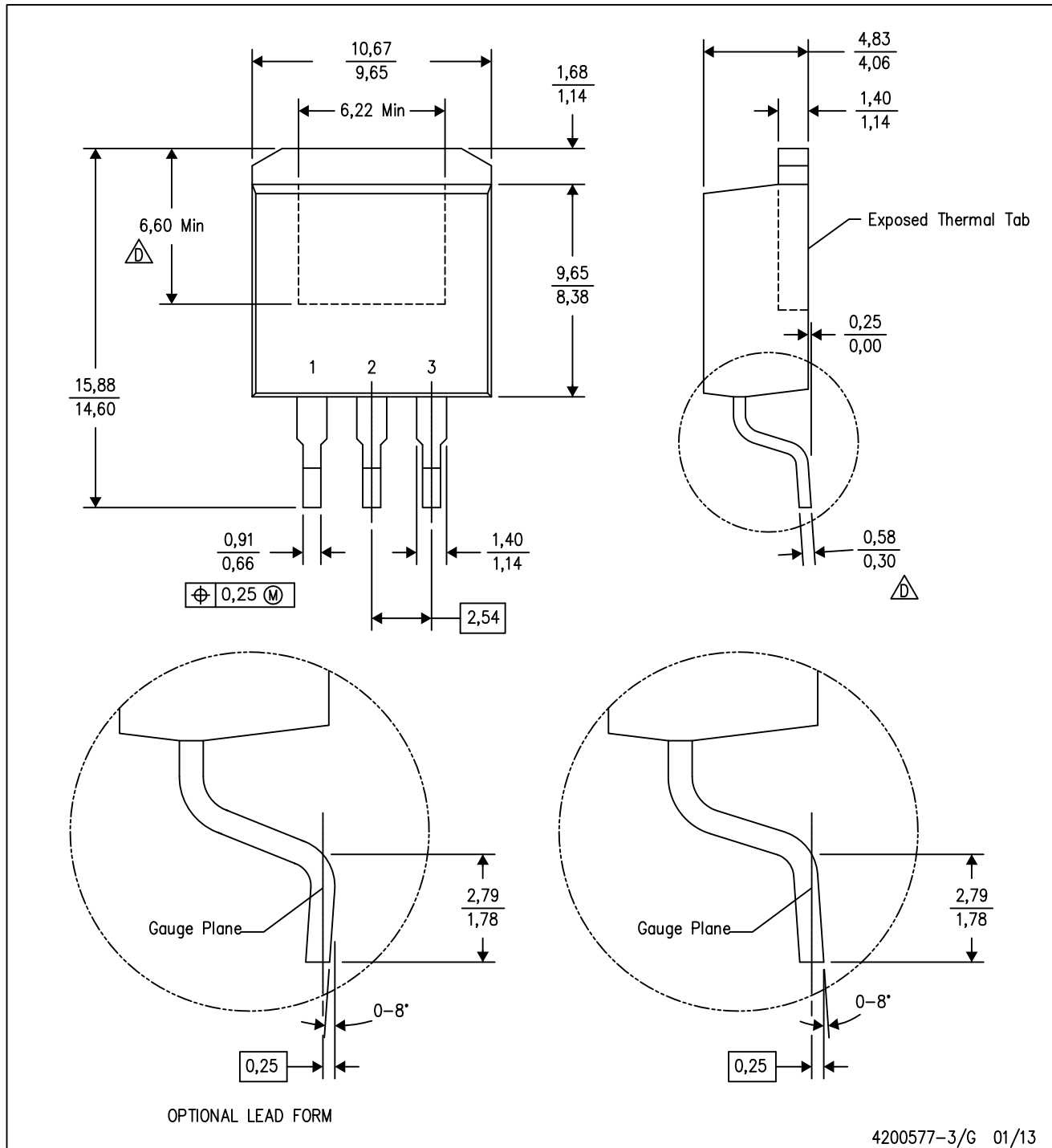


LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE:15X

4222214/B 08/2018

KTT (R-PSFM-G3)

PLASTIC FLANGE-MOUNT PACKAGE

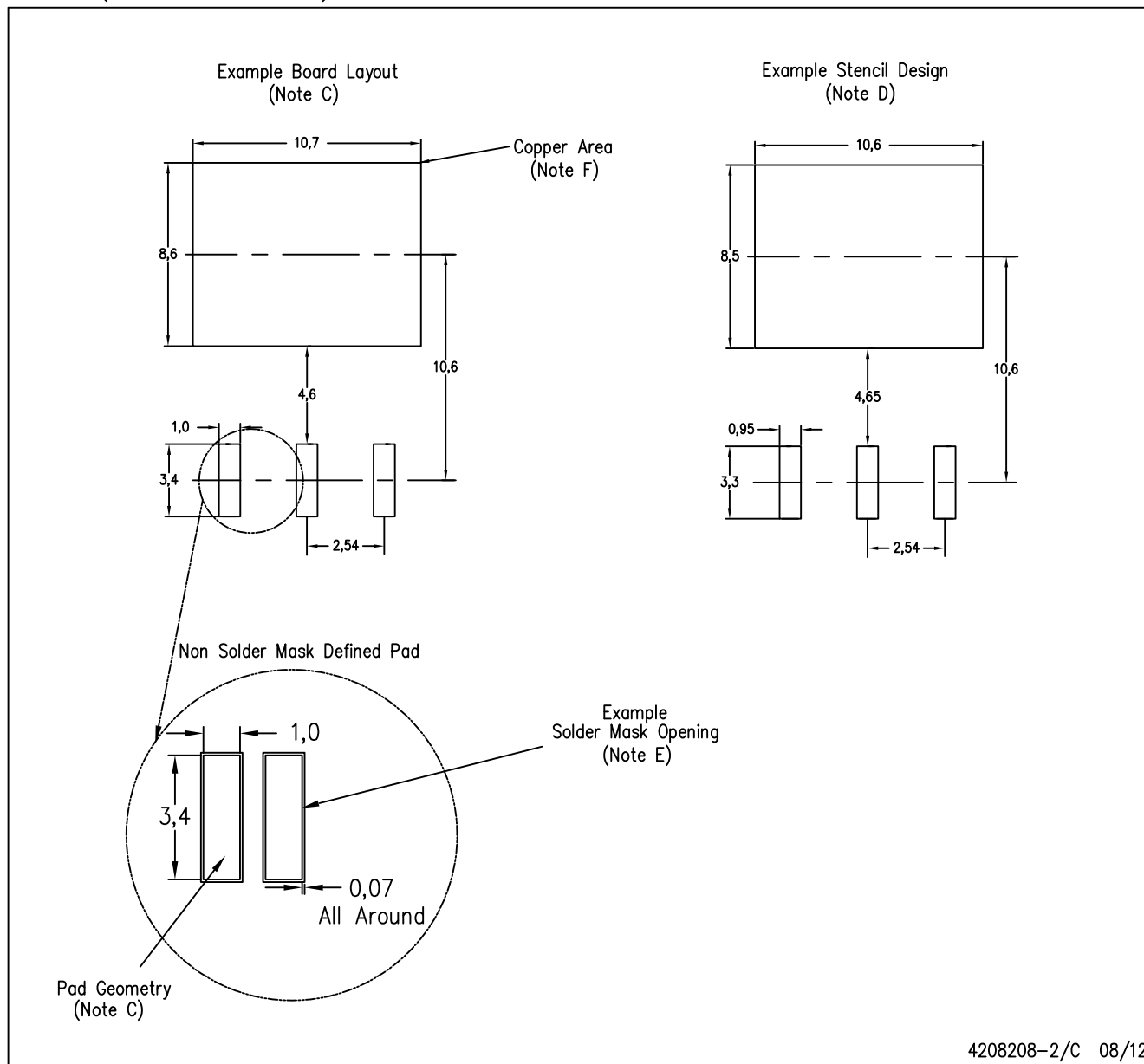


4200577-3/G 01/13

- 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.
- $\triangle$ Falls within JEDEC TO-263 variation AA, except minimum lead thickness and minimum exposed pad length.

KTT (R-PSFM-G3)

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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